ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 1987

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

NINETY-NINTH CONGRESS

SECOND SESSION

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Budget Highlights

FY 1987

U.S. Department of Energy
Assistant Secretary,
Management and Administration
Office of the Controller
Washington, D.C. 20585

February 1986

Department of Energy
FY 1987 Budget Highlights

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INTRODUCTION

On December 13, 1985, the President signed the Balanced Budget and Emergency Deficit Control Act of 1985 into law. This historic legislation, more commonly known as the Gramm-Rudman-Hollings bill, mandates a program of budget actions designed to reduce the Federal deficit to zero by FY 1991. The FY 1987 budget request of the Department of Energy is fully responsive to the requirements of that Act, and supports the major policy themes of the Administration. It provides adequate funding for the energy and general science missions of the Department, and allows for real growth in defense activities. Budget support is limited to activities which are clearly the responsibility of the Federal government or where matching funds from the private sector can be utilized in cooperative research and development ventures.

A moratorium on further development and fill of the Strategic Petroleum Reserve (SPR) is being proposed. The level of protection provided by almost 500 million barrels of crude oil is ample, given the current conditions of relative energy security, and additional spending is not warranted in times of high Federal deficits. The budget also proposes turning over responsibility for further funding of conservation grant programs to the individual states, which can make use of large sums anticipated to be provided to the states in the settlement of oil pricing and allocation violations and earmarked for conservation and other energy-related programs.

The budget strongly supports important initiatives first announced last year to improve safety, security, and environmental protection at the Department's facilities. Enhanced attention to these issues is a management requirement for all organizational elements of the Department of Energy.

Several elements of the Department which closely resemble business activities are being proposed for sale to the private sector, thereby relieving the taxpayer from further annual funding requirements and securing compensation for prior Federal investments. Legislation will be submitted which would authorize the process of relinquishing Federal control of the Naval Petroleum Reserves and the Power Marketing Administrations. Also, the Uranium Enrichment enterprise will seek to transfer development and ultimate deployment of advanced enrichment technology to the private sector, and begin repayment of the unrecovered Federal investment in the enrichment program.

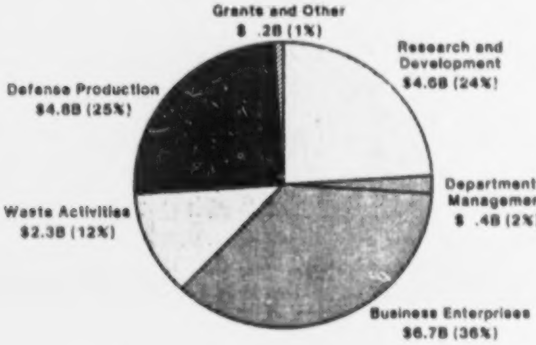
The discussion which follows displays the budget in a format which groups the varied activities of the Department of Energy under titles which best describe the nature of the effort.

"Research and Development" groups scientific and technical activities being performed in a number of areas, including energy, general science, and atomic energy defense. "Defense Production and Support" describes that segment of the Department's defense activities which is concerned with the production of weapons and special nuclear materials. "Waste Activities" combines civilian and defense waste programs for the processing, transportation and ultimate disposition of nuclear waste. "Business Enterprises" groups activities of the

Department which generate revenues and store or market products, and which are managed like businesses. "Grants and Other Energy Functions" is a grouping of non-research conservation grant programs and such essential activities as energy information and regulation. Finally, "Departmental Management" includes the various overhead activities of the headquarters and field organizations.

RESOURCE SUMMARY

The Department of Energy is a complex organization which manages activities in a wide variety of technical fields and operates major facilities across the United States. The magnitude of the overall enterprise is not revealed by the request for budget authority alone. The Department owns or operates facilities, including 8 National Laboratories, which comprise more than 9,000 buildings totalling over 107 million square feet, with an estimated replacement value exceeding $30 billion. Also, several of the Department's activities generate revenues which are either retained by the Department to offset requests for budget authority or are returned directly to the Treasury. The chart below displays the Department's total resources for FY 1987, defined as budget authority plus revenues generated, for each of the major activities described in the Introduction.


FY 1987 Resource Summary
(Dollars in Billions)

Total Budget Resources $19.0 Billion

In this rendering of the Department's total resources, Business Enterprises comprise the largest share, $6.7 billion, or 36 percent of the total. This grouping includes the five Power Marketing Administrations, the Uranium Enrichment complex, the Naval Petroleum and Oil Shale Reserves, the Strategic Petroleum Reserve, and certain miscellaneous receipts. The Power Marketing Administrations generate revenues, estimated at $3.7 billion in FY 1987, for marketing the electric output from Federal power facilities. The sale of petroleum and related products produced from the Naval Petroleum Reserves is expected to return approximately $1,012 million to the Treasury in FY 1987. The sale of enriched uranium to domestic and foreign customers is expected to provide approximately $1,286 million in revenues to offset the cost of providing enrichment services in FY 1987. Adding these revenues to the request for budget authority reveals more clearly the size and importance of those varied Departmental activities which resemble businesses in that they generate revenues.

The other area where revenues are an important part of total resources is Waste Activities. The Nuclear Waste Fund is one of the principal components of this group of activities, and it is financed by fees collected from civilian nuclear utilities and deposited in a special account in the Treasury. In FY 1987, these fees and interest on Fund balances are expected to total $538 million.

OVERVIEW OF THE FY 1987 BUDGET

The request for new budget authority for the Department's activities in FY 1987 is $12.1 billion. The following table displays this request. The FY 1986 numbers displayed in this and all other tables in this document represent FY 1986 enacted appropriations less amounts sequestered by Presidential Order on February 1, 1986, pursuant to the Gramm-Rudman-Hollings Emergency Deficit Control Act.

	Budget Authority (in millions)	
DEPARTMENT OF ENERGY	FY 1986 Estimate	FY 1987 Request
Research and Development	$ 4,869.5	$ 4,539.0
Defense Production and Support	4,332.8	4,830.8
Waste Activities	1,363.6	1,774.3
Business Enterprises	869.4	691.4
Grants and Other Energy Functions	386.0	113.5
Departmental Management	150.3	151.1
TOTAL, DEPARTMENT OF ENERGY	$11,971.6	$12,100.1

The FY 1987 budget for the Department of Energy provides adequate funding to meet the Department's commitment to support basic research, energy technology development, and national security, and to perform other functions which benefit government and the public. The Department's request for new budget authority in FY 1987 is $12.1 billion, approximately $128 million more than FY 1986. Increased funding requirements for Defense Production and Support and Waste Activities and, to a much lesser extent, in Business Enterprises, more than offset reductions in Research and Development, Grants and Other Energy Functions, and Departmental Management.

The programs represented in the Research and Development category vary widely in nature, but share a concentration on longer-term basic and applied research and technology development. Some of the programs included here have no direct application to energy, but examine the basic constituents of matter. Other programs have direct application to increasing energy supplies or improving end-use efficiencies, such as nuclear, solar, fusion, fossil and conservation research and development. Other programs conduct research and development on weapons and naval nuclear propulsion systems.

The FY 1987 budget for Research and Development is about 7 percent below the FY 1986 level when amounts of new budget authority are compared. However, the levels of actual program activity in the two years are much closer, as FY 1987 will benefit from large sums of unobligated budget authority carried over from FY 1986 and made available for program use. Most of these unobligated balances will result from savings due to rigorous cost cutting in the Uranium Enrichment program.

Within the Research and Development category, increases in high energy and nuclear physics, environmental activities, weapons research and development, and Naval reactors are more than offset by reductions to fossil, conservation, solar, nuclear energy and magnetic fusion programs.

Defense Production and Support increases by $498 million, due to increased requirements from the Department of Defense for weapon systems, and for special nuclear materials for use in weapon systems and by the nuclear Navy.

Waste Activities includes all programs involved with civilian and defense nuclear waste, including research and development on promising technologies for storing, handling and disposing of the waste, programs for a permanent geologic high level waste disposal system, and remedial actions for stabilizing, decontaminating and decommissioning Department of Energy and certain non-government facilities where radioactive contamination has been found.

The budget requirement for Waste Activities is 30 percent greater in FY 1987 than FY 1986, with increases in all major program elements; the Nuclear Waste Fund, Remedial Action and Waste Technology, and Defense Waste Management.

The budget request for Business Enterprises is $691.4 million. Funding requirements for Business Enterprises are about 20 percent lower than in FY 1986. This category includes the Naval Petroleum Reserves and the Power Marketing Administrations, for which the Administration will submit legislation to permit their transfer to non-Federal control. However, the budget includes full funding for these activities through FY 1987. It also includes the Uranium Enrichment program and the Strategic Petroleum Reserve.

The Grants and Other Energy Functions category has a budget request well below the FY 1986 level, due primarily to the withdrawal of direct appropriations requirements for the State energy conservation grant programs. These programs will be able to rely on large sums collected in settlement of petroleum pricing and allocation violations.

Departmental Management, which includes overhead functions in Washington and the field, is slightly down in FY 1987, but this is due to increased offsetting revenues received for work done for other foreign and domestic customers. Program activities will actually be performed at somewhat higher levels of funding.

RESEARCH AND DEVELOPMENT

Research and Development programs are primarily long-term, high-risk efforts which support a mix of technologies aimed at improving our understanding of the fundamentals of matter, improving weapons and naval nuclear propulsion systems, expanding domestic energy supplies, and achieving greater efficiency in energy use. In addition to specific energy technology programs, the Department conducts research in basic energy sciences and on the health and environmental uncertainties of energy technologies. These activities are carried out by university, industry, and government research personnel, utilizing highly specialized research facilities.

Cooperative research and development ventures with industry will be explored in the fossil, conservation, and renewable energy technology areas in FY 1987.

	Budget Authority (in millions)	
RESEARCH AND DEVELOPMENT	FY 1986 Estimate	FY 1987 Request
General Science	$ 661.4	$ 773.4
Magnetic Fusion	365.4	333.0
Nuclear Energy	377.4	332.7
Environment	228.6	273.8
Supporting Research and Technical Analysis	519.7	551.9
Fossil Energy	343.0	150.1
Clean Coal Technology	(99.4)[a]	(149.1)[a]
Conservation Research and Development	170.9	71.2
Solar and Other Renewables	173.6	91.9
Electric Energy Systems and Storage	28.8	16.2
Weapons Research, Development and Testing	1,729.8	2,101.2
Naval Reactors Development	535.7	593.6
Subtotal	$5,134.3	$5,289.0
Use of Prior Year Balances and Other Adjustments	-264.8	-750.0[b]
TOTAL, RESEARCH AND DEVELOPMENT	$4,869.5	$4,539.0

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[a] Non add; transfers of previously appropriated funds.

[b] Includes $584.2 million of prior year unobligated balances in the Uranium Enrichment program.

GENERAL SCIENCE

The Department's General Science programs support basic research to discover and understand the fundamental constituents of matter and energy and the basic forces in nature. An understanding of the laws of nature and the basic components from which matter and energy are composed forms the foundation upon which modern science and technology rest. Deeper understanding contributes, sometimes in spectacular ways, to all scientific disciplines and to our Nation's technological base. This research is conducted through two interrelated scientific programs: High Energy Physics and Nuclear Physics. Program direction funds provide the salaries, benefits and associated costs for the staff for these two programs.

Funding for these programs is proposed as follows:

	Budget Authority (in millions)	
GENERAL SCIENCE	FY 1986 Estimate	FY 1987 Request
High Energy Physics	$ 494.8	$ 546.7
Nuclear Physics	164.5	224.2
Program Direction	2.1	2.5
Subtotal	$ 661.4	$ 773.4
Use of Prior Year Balances and Other Adjustments	-5.5	---
TOTAL, GENERAL SCIENCE	$ 655.9	$ 773.4

High Energy Physics

High Energy Physics is an exploratory field of basic research in which experimental and theoretical studies are conducted on the fundamental constituents of matter and the fundamental forces of nature in an attempt to understand energy and matter and their transformations. The method of achieving the program objectives involves the use of large particle accelerators, colliding beam facilities, and particle detectors. Proposals from university and laboratory user groups for accelerator research time are evaluated by scientific program advisory committees which recommend those proposals with the greatest scientific merit.

A major feature of the High Energy Physics program in FY 1987 will be the first operation for research of the Tevatron proton-antiproton colliding beam capability at Fermilab and the Stanford Linear Collider (SLC), an electron-positron collider, at the Stanford Linear Acceleration Center (SLAC). The program will also include operation and research utilization of the fixed target program at Fermilab, the Alternating Gradient Synchroton (AGS) at Brookhaven National Laboratory, including its unique high energy polarized proton beam, and the Positron-Electron Project (PEP) colliding beam program at Stanford. The request provides support for participation by university based groups in experimental research, including accelerator user group efforts and non-accelerator experiments, and for theoretical research efforts. The FY 1987 program also provides funding for continuation of advanced technology research and development which includes funding for research and development on superconducting magnets and systems related to the next generation particle collider. The results of prior research and development in this area will provide the technical information for an indepth Departmental review of a Superconducting Super Collider (SSC) type facility. Those results can be expected to have a strong impact on the direction and emphasis of the FY 1987 research and development studies in the advanced accelerator program.

Nuclear Physics

Nuclear Physics is an exploratory field of basic research in which experimental and theoretical studies are conducted on the structure and behavior of atomic nuclei, and on understanding the behavior of nuclei in terms of the fundamental constituents of matter and laws of nature. The FY 1987 request will maintain the overall utilization of the national accelerator facilities at approximately the same level as in FY 1985 and above that projected for FY 1986. In late FY 1986, the Tandem/AGS Heavy Ion Transfer Line construction project at Brookhaven national Laboratory (BNL) will be completed. In FY 1987, research programs to study relativistic heavy ion collisions with this new facility in a previously inaccessible energy regime will be initiated. The Transfer Line couples the BNL Tandem and Alternating Gradient Synchrotron (AGS) accelerators to provide heavy ion beams up to energies of 14 billion electron volts per atomic mass unit (GeV/AMU) for atomic nuclei up to mass 32 (sulfur). This AGS/Tandem facility will provide beams approximately seven times more energetic than have been previously available anywhere in the world and will offer the possibility that for the first time scientists may be able to create exotic new states of nuclear matter which have never before been observed in the laboratory.

The highest priority for new construction in basic nuclear research in the United States is the Continuous Electron Beam Accelerator Facility (CEBAF) at Newport News, Virginia. Construction will be initiated in FY 1987 and supporting research and development will continue. CEBAF will be a major facility centering on an electron linear accelerator/stretcher ring complex capable of delivering intense, continuous beams in the energy range from 500 to 4,000 MeV. CEBAF's combination of continuous beam, high intensity, and high energy will provide a unique world-class research facility.

MAGNETIC FUSION

The goal of the Magnetic Fusion Energy program is to establish the scientific and technological base required for fusion energy. The long-term need and desirability for such an energy supply system continues to be strong. The development of magnetic fusion could lead to economic energy sources that possess a secure fuel reserve, as well as acceptable environmental and safety features. Nearer term benefits of fusion development include an increased understanding of plasma physics and related scientific fields, as well as training scientists and engineers.

The FY 1987 budget of $333.0 million supports a program focused on the development of the toroidal magnetic confinement system. The program has been structured to maintain the highest priority tasks, improve the cost effectiveness of facility operations, and increase the use of international collaboration. The program will support research in four key technical areas: namely, the development of magnetic confinement systems, understanding the scientific principles governing the behavior of burning plasma, the development of materials for fusion applications, and the development of fusion nuclear technology.

NUCLEAR ENERGY

Continuing Nuclear Energy research and development in FY 1987 will help assure that nuclear energy contributes to our civilian needs for a balanced and secure domestic energy base as well as our emerging military needs to meet national security objectives, and provide the technical and industrial base for continued deployment of advanced nuclear technologies in the future.

Nuclear energy research and development program emphasis and priorities are being shifted significantly consistent with increasing space and defense nuclear energy needs, currently anticipated timing for commercial deployment of advanced reactors beyond light water reactors, and limited research and development resources. The primary emphasis in advanced reactor research and development is to support national security requirements, including the Strategic Defense Initiative. Certain benefits that accrue from this research and development work will be applied to future civilian reactor development efforts and some complementary civilian reactor base technology programs will continue. Development and production of radioisotope power sources for space and terrestrial applications will be continued. Since application of improved "state of the art" light water reactors represents the most likely path to revitalizing the nuclear power option, emphasis is on supporting a process leading to enhanced safety, rationalized licensing, and certification of advanced designs. Supporting these research and development efforts will be the continued operation of the unique test facilities and analytical laboratories required for developing and verifying advancements in reactor systems, fuel, components and power conversion systems. Thus, the nuclear energy segment of the Nation's energy supply triad (nuclear, fossil, and renewable energy resources) will be maintained as a critical element in providing a strong, secure, and stable supply of energy at reasonable cost. The Nuclear Energy research and development program incorporates the following program elements:

NUCLEAR ENERGY	Budget Authority (in millions) FY 1986 Estimate	 FY 1987 Request
Light Water Reactors	$ 48.1	$ 41.0
Advanced Reactor Research and Development	128.6	49.5
Space and Defense Power Systems	20.2	71.7
Advanced Nuclear Systems	19.5	23.6
Facilities	132.2	121.8
Water Cooled Breeder Reactor Technology	19.0	13.8
Program Direction	9.8	11.3
Subtotal, Nuclear Energy	$ 377.4	$ 332.7
Use of Prior Year Balances and Other Adjustments	-19.3	---
TOTAL, NUCLEAR ENERGY	$ 358.1	$ 332.7

Light Water Reactors

The Light Water Reactor (LWR) activity is a cooperative effort between industry and government that supports the use of improved safety systems and improves the productivity of current and future light water reactors. The program includes a redefinition of the Federal regulatory role and enhancement of this role with supporting light water reactor technical research and development programs. One milestone of the program is Nuclear Regulatory Commission certification of at least two advanced light water reactor systems within approximately 5 years. Research and development efforts at Three Mile Island (TMI) will be conducted on the removal and examination of the damaged reactor core and core materials and the resultant data transferred to the industry and regulatory community. DOE's TMI activities will be completed in FY 1988.

Advanced Reactor Research and Development

The Advanced Reactor Research and Development program will conduct tests, experiments, and studies in advanced reactor research to support a continuum of both civilian and military energy requirements. FY 1987 will serve as a transition period during which military power needs will be identified, certain activities will be phased out, and the research and development emphasis will be shifted from satisfying primarily the needs of the civilian sector for advanced reactors to meeting the space and terrestrial power needs for the military. Activities will be directed toward the efficient use of the technical, testing, analytical, and design infrastructure for advanced reactor systems to meet the emerging military requirements as well as those of the commercial sector for the future deployment of advanced reactor systems.

Space and Defense Power Systems

The Space and Defense Power Systems program is an integrated set of research and development activities that will develop nuclear power sources to support emerging Department of Defense requirements for a variety of terrestrial and space missions, including the Strategic Defense Initiative. The program provides the design, development and supporting technology for building low power and multi-megawatt power systems. The low power systems include the SP-100 space reactor power system (up to about 1 MWe), the 15 KWe terrestrial Small Nuclear Power Source Demonstration, and the Dynamic Isotope Power System (about 1 to 10 KWe) for space use. The multi-megawatt systems include space reactors that must produce several megawatts of continuous electric power for sustained time periods, as well as hundreds of electrical megawatts for short durations; and a 10 MWe terrestrial powerplant.

Though primarily designed to meet national security requirements, the reactor and isotope technologies developed in these activities may well have applicability for future civilian space and terrestrial commercial systems.

Advanced Nuclear Systems

Nuclear power is an enabling technology for many missions requiring lightweight, highly reliable power supplies. This activity provides nuclear radioisotope power sources to meet civilian and military applications. Improved heat source manufacturing techniques, refractory metal encapsulation developments, and modular system designs will be pursued to enhance the quality of delivered products that meet user requirements and application configurations. This includes the development of an advanced RTG design - Modular Isotope Thermoelectric Generator to meet NASA interplanetary mission power requirements. Other system support facilities will be operated, tested and maintained in a state of production readiness to support production operations planned in FY 1988.

Facilities

FY 1987 will be a transition year for the nuclear reactor test facilities, reflecting the change in program emphasis to support primarily military space and terrestrial energy near-term requirements. Facility operations are directed at conducting required tests to support and verify advances in fuels, core systems, materials, safety, components, and instrumentation and control systems in support of defense, space, and civilian energy program requirements. Facilities are also used to support international agreements and non-nuclear program activities. A cost sharing approach is being established that provides a more equitable distribution of costs among facility users. This cost sharing approach will be partially implemented in FY 1987, with full implementation planned for FY 1988. Synergistic benefits will accrue to all reactor development projects through the conduct, analysis, evaluation and documentation of the facilities test programs.

Water Cooled Breeder Reactor Technology

The focus of activity efforts in FY 1987 will be to complete evaluation of the light-water breeder core removed from the Shippingport Atomic Power Station to verify breeding, thereby bringing this project to a conclusion.

ENVIRONMENT

The Department's programs are formulated in a manner that balances energy production requirements with the need to protect the environment. The Environment, Safety and Health program, the Liquefied Gaseous Fuels Spill Test Facility, and the Biological and Environmental Research program support activities that help reduce the health and environmental uncertainties associated with energy technology. These programs are closely integrated with the other energy research and development and operating activities of the Department to assure that activities are conducted in a safe and environmentally sound manner. The budget is allocated as follows:

	Budget Authority (in millions)	
ENVIRONMENT	FY 1986 Estimate	FY 1987 Request
Environment, Safety, and Health	$ 46.9	$ 76.1
Liquefied Gaseous Fuels Spill Test Facility	1.7	1.2
Biological and Environmental Research	180.0	196.5
TOTAL, ENVIRONMENT	$ 228.6	$ 273.8

Environment, Safety, and Health

The goal of the Environment, Safety, and Health (ES&H) program is to develop policies and standards for safety and environment within all Departmental programs, and to assure safe and environmentally sound operations at all DOE facilities. The increased funding in FY 1987 will continue to support the key elements of the Department's long-range plan which will provide the framework for a strong emphasis on environmental and safety matters at Department of Energy facilities. The Department is conducting a baseline survey of all facilities to identify existing areas of environmental risk. Results from the survey will be used to prioritize areas requiring corrective action in a knowledgeable and orderly manner. Technical safety appraisals of the Department's nuclear facilities will also be conducted to determine compliance with safety requirements, and to apply lessons learned from industry. As with the environmental survey, results of these appraisals will be used to prioritize and implement corrective measures.

Liquefied Gaseous Fuels Spill Test Facility

This facility at the Nevada Test Site supports user-sponsored research on safe handling, shipping, and storage of liquified gaseous fuels and other hazardous fluids. Funding in FY 1987 will provide a bridge from the current Departmental program to one supported by industry and other government agencies; for example, the Department of Transportation and the Environmental Protection Agency.

Biological and Environmental Research

A central objective of the Department's Biological and Environmental Research (BER) Program is to create a knowledge base that will permit a realistic assessment of the impact of energy strategies before they are adopted. The accumulation of such knowledge requires long term research that is comprehensive and multidisciplinary in its scope, and quantitative and mechanistic in its level of understanding. Health and environmental effects research sponsored by the Department and its predecessor agencies has ranged from pioneering molecular investigations of such fundamentally important processes as DNA damage repair mechanisms, through systemic studies such as those that provided the earliest information on bone marrow transplantation, to the investigation of global processes that govern atmospheric transport.

The BER program for FY 1987 will continue its focus on understanding the long-term health and environmental responses to acute and chronic exposures to radiation and energy-related chemicals. In addition, research on the development and application of non-invasive imaging techniques for diagnosis and treatment of disease, and on the development and production of radionuclides and radiopharmaceuticals for the treatment of tumors and for the study of metabolic and other kinetic processes, will be continued.

Other planned FY 1987 activities include programs in atmospheric processes and consequences for societal issues such as acid rain, and carbon dioxide climatic effects; terrestrial and oceanographic processes; molecular, cellular and systemic studies on the effects of radiation, including radon emissions; nuclear medicine, structural biology, molecular epidemiology, and long term biotechnology related projects.

SUPPORTING RESEARCH AND TECHNICAL ANALYSIS

The Supporting Research and Technical Analysis programs are focused on areas of fundamental science that have the greatest potential for impact on energy production; on the assessment of technologies that have potentially high payoffs in the future; and on the training of future energy professionals. The FY 1987 funding request is allocated as follows:

SUPPORTING RESEARCH AND TECHNICAL ANALYSIS	Budget Authority (in millions) FY 1986 Estimate	 FY 1987 Request
Basic Energy Sciences	$ 433.8	$ 441.4
University Research Instrumentation	6.3	5.0
University Research Support	10.3	11.0
Energy Research Analysis	2.6	3.6
Advisory and Oversight Program Direction	2.7	2.9
Multiprogram Laboratories Facilities Support	39.8	60.2
Technical Information and Management	12.4	10.8
In-House Energy Management	11.7	16.5
Policy and Management	.1	.5
Subtotal	$ 519.7	$ 551.9
Use of Prior Year Balances and Other Adjustments	---	-38.3
TOTAL, SUPPORTING RESEARCH AND TECHNICAL ANALYSIS	$ 519.7	$ 513.6

Basic Energy Sciences

The Basic Energy Sciences (BES) program is responsible for generic, long-range energy-related research in support of both nuclear and non-nuclear energy technologies. To carry out the program, BES supports energy related research and the operation of research facilities in the physical and biological sciences, engineering, applied mathematics, and geosciences. In FY 1987 funds will continue the construction of the Center for Advanced Materials at the Lawrence Berkeley Laboratory; the upgrade of the National Synchrotron Light Source at the Brookhaven National Laboratory; the enhancement to the Synchrotron Radiation Laboratory at the Stanford Linear Accelerator Center; the construction of the Ion Collision Physics Facility at Kansas State University; the construction of the experimental guidehall at the Los Alamos Neutron Scattering Center; and the initiation of construction for the Advanced Light Source at the Lawrence Berkeley Laboratory.

University Research Instrumentation

The University Research Instrumentation program provides support to university research groups on a competitive basis for the purchase of major, state-of-the-art scientific research instrumentation which is essential for continued progress in advanced energy related scientific and technical research. This program is complementary to and does not replace the Department's efforts to provide funds for scientific equipment required on individual research projects supported through the cognizant research programs.

University Research Support, Energy Research Analysis, and Advisory and Oversight Program Direction

The University Research Support program provides for energy-related research and training programs through university reactor fuel assistance, university laboratory cooperative research, energy manpower development, and related education and training activities. The Energy Research Analysis program provides the capability for an independent, rigorous assessment of the research base that underlies a variety of energy technologies.

Advisory and Oversight Program Direction funds the personnel who administer the field operations management, University Research Support, Energy Research Analysis, and Multiprogram Laboratories Facilities Support programs. It also supports the Energy Research Advisory Board.

Multiprogram Energy Laboratories Facilities Support

The goal of the Multiprogram Energy Laboratories Facilities Support program is to provide for the rehabilitation and replacement of support facilities which are essential to the continued operation of the Department's multiprogram sites, and to prolong the life of the Government's large investment in real property facilities. A total of $60.2 million is requested for this program in FY 1987, including $25.2 million for environmental compliance activities at the Oak Ridge National Laboratory.

Technical Information and In-House Energy Management

The Technical Information and Management Program has the centralized responsibility to ensure that the results from the Department's multibillion dollar research and development programs are catalogued and available for dissemination and that DOE researchers have assess to worldwide sources of energy information.

In-House Energy Management

The goal of the In-House Energy Management Program is to reduce energy consumption and utility/energy costs for Departmental facilities. As such, the program supports all mission areas. This program is structured to survey and study facilities and processes owned by the Department in order to identify retrofits and modifications to Departmental facilities which save energy and have a high return on investment. Projects identified are competed on a Department-wide basis and selected to maximize the Department's economic return.

FOSSIL ENERGY

Fossil fuels--oil, natural gas and coal--accounted for 90 percent of the energy consumed in the United States during 1984, and will probably supply the majority of the Nation's energy needs well into the next century. Over the longer term, it is expected that the Nation will look increasingly to coal as a primary source of energy. A key element in the gradual transition to more abundant domestic fossil resources will be technology advancement, which holds the potential for utilizing coal directly in applications previously requiring conventional liquid or gaseous fuels and of significantly improving the economics associated with the present generation of technology. This includes improving the economics to reduce environmental impacts associated with certain abundant fossil resources, such as coal and oil shale, to acceptable levels. The Department's Fossil Energy program is geared toward establishing an adequate scientific and engineering knowledge base to support private sector efforts to develop and deploy these technologies.

The budget request is divided into three functional elements: the cooperative research and development venture pool will fund applied research and development joint ventures with industry. The government will take a minority position in these ventures. Technology base development funds will provide direct support for basic, fundamental and crosscutting research through contracts and research grants directed principally to national laboratories, Energy Technology Centers, and universities. Finally, applied research and development activities will be funded with industry using various contractual instruments.

	Budget Authority (in millions)	
FOSSIL ENERGY	FY 1986 Estimate	FY 1987 Request
Coal	$ 246.0	$ 82.2
Petroleum	29.1	9.9
Gas	8.5	5.3
Cooperative Research and Development Venture Pool	---	12.5
Program Direction and Management Support:		
Headquarters Program Direction	13.4	11.3
ETC Program Direction	39.3	28.7
Federal Inspector for Alaska Gas Pipeline	0.5	0.2
Plant and Capital Equipment	6.2	---
Subtotal	$ 343.0	$ 150.1
Use of Prior Year Balances and Other Adjustments	-31.0	-67.3
TOTAL, FOSSIL ENERGY	$ 312.0	$ 82.8

Coal

The objective of this program will be to continue that research necessary to provide an adequate scientific and engineering knowledge base to foster technological advances by the private sector, as well as to remove key uncertainties. The 1987 research activities provide for basic fundamental and crosscutting research, which is primarily done at universities, national labs, and in-house at the Energy Technology Centers. The majority of this research will be conducted through the advanced research and technology development program. Research efforts will also be continued in the coal liquefaction, surface coal gasification, control technology and coal preparation, combustion systems, fuel cells, and heat engine programs.

Petroleum

The Petroleum program will fund research which could lead to improved technologies for the exploration, development and production of petroleum resources. In FY 1987, the in-house effort will concentrate on enhanced recovery of light and heavy oils. The fundamental studies of chemistry and physics related to oil shale processes will also continue, as well as environmental mitigation efforts. In Advanced Process Technology, a broad spectrum of efforts will be pursued aimed at expanding the knowledge base for extraction technologies.

Gas

The Gas program will continue to assist the private sector in developing cost-effective diagnostic and extraction technologies which are required to produce gas efficiently and economically from the vast unconventional gas resources. A research program is proposed in FY 1987 to provide a broad technology base.

Cooperative Research and Development Venture Pool

In FY 1987, a pilot program has been proposed in cooperative research and development ventures with industry. This pilot program has been established to fund applied research and technology development-type efforts that were traditionally funded within the existing fossil energy research and development program activities. This new delivery mechanism should provide for increased cost-sharing by industry consortia, as well as an active form of technology transfer by encouraging potential beneficiaries of the research to become direct participants from the beginning. The Department will place few restrictions on proposals for industry cooperative research and development, but it is likely that the first such consortia to be formed will be in the areas of extraction technology. The Department hopes to expand this mechanism of support to most industrially-performed work during the next few years.

Program Direction and Management Support

This program provides salaries and benefits for both Headquarters and field personnel in Fossil Energy, as well as overhead expenses which have been funded in prior years by assessment of the technical programs. In addition, it provides support for the day-to-day project management functions, including indirect costs at the Energy Technology Centers such as facility operation, maintenance, overhead, personnel and administrative support, and other non-programmatic field support activities. This activity also provides funding for the Office of the Federal Inspector of the Alaska Gas Pipeline for administrative support purposes. A total of $40.2 million is requested in FY 1987.

CLEAN COAL TECHNOLOGY

The overall goal of the Clean Coal Technology Program is to provide financial assistance for the construction and operation of clean coal technology projects to demonstrate their feasibility for future commercial applications. These demonstration projects are intended to provide sufficient technical, economic, environmental, health and safety, and operational information on a large enough scale to enable the private sector to make rational commercialization decisions.

Specific objectives of the program are to issue a competitive solicitation for Federal assistance to the private sector applicable to the broad array of emerging clean coal technology systems for use in all energy market applications, and to enter into cost-shared cooperative agreements to demonstrate selected systems. Funding for three years has been made available as follows: $99.4 million in FY 1986, $149.1 million in FY 1987, and $149.1 million in FY 1988.

CONSERVATION RESEARCH AND DEVELOPMENT

The aim of the Energy Conservation Research and Development program is to assist the private sector by conducting energy conservation research to expand the technology base upon which industry can draw in developing new products and processes for the commercial market. The program supports activities ranging from basic research in universities and national laboratories to applied research and development and proof-of-concept projects in industrial firms.

In addition, a new innovative cooperative research and development approach will be carefully reviewed and expressions of interest will be solicited from industry. Participation in industry-formed cooperative research and development ventures to support longer-term, precompetitive, applied technology development can be an effective method to leverage scarce Federal resources and increase program impact. This is intended to promote more effective technology transfer and to allow broader research support within current fiscal limitations.

Reductions in the Energy Conservation Research and Development program are proposed in the 1987 Budget to limit the Federal role consistent with budgetary constraints.

	Budget Authority (in millions)	
CONSERVATION RESEARCH AND DEVELOPMENT	FY 1986 Estimate	FY 1987 Request
Buildings and Community Systems	$ 37.3	$ 14.1
Industry	40.1	15.6
Transportation	56.6	19.8
Multisector	25.6	19.9
Policy and Management	1.7	1.8
Facilities	9.6	---
Subtotal	$170.9	$ 71.2
Use of Prior Year Balances and Other Adjustments	---	-36.8
TOTAL. CONSERVATION RESEARCH AND DEVELOPMENT	$170.9	$ 34.4

Buildings and Community Systems

The 1987 buildings and community systems program will support generic research in building sub-systems, lighting equipment, thermally activated heat pumps, the Federal Energy Management Program, appliance standards, and technology transfer activities to assist the private sector in adopting new energy-conserving technologies.

Industry

The objective of the Industrial program is to support research and development of generic technologies in waste energy reduction and improved process efficiency which have the potential to increase energy use efficiency in private industry. FY 1987 efforts will address combustion technology, advanced heat exchangers and heat pumps, innovative concepts for the utilization of industrial waste materials, and the development of new energy efficient processes for the production of materials and products.

Transportation

The Transportation program focuses on research efforts to improve energy efficiency of vehicle systems. The 1987 transportation program will support cross-cutting research and development in advanced high-temperature materials; alternative vehicle propulsion concepts; alternative fuels; transportation systems utilization; and electric and hybrid vehicles.

Multisector

The Multisector program supports basic research and exploratory development of new concepts that offer increased efficiencies in energy conversion and utilization applications. The 1987 multisector program will support cross-cutting research and development at universities and national labs in such areas as combustion and thermal sciences, materials sciences, biocatalysis, and tribology. The Multi-sector program also supports the energy-related inventions program, which assists independent inventors, and the National Appropriate Technology Assistance Service.

SOLAR AND OTHER RENEWABLES

The solar and other renewable programs support research and development that will strengthen the technology base on which industry can draw in developing future new products and processes for the commercial market. The programs support activities ranging from basic research in universities and national laboratories to applied research and development and proof-of-concept projects in industrial firms.

Reductions in the Renewable Energy research and development programs are proposed in the 1987 Budget to limit the Federal role consistent with budgetary constraints. A new funding approach for applied, but pre-competitive, technology development involving partnerships with industry cooperative research and development ventures will be investigated, and expressions of interest will be solicited from industry. The use of cooperative research and development ventures can be an effective method of leveraging constrained Federal resources, and has the additional advantage of promoting more effective technology transfer to the private sector. In FY 1987, funding is allocated as follows:

	Budget Authority (in millions)	
SOLAR AND OTHER RENEWABLES	FY 1986 Approp.	FY 1987 Request
Solar Energy	$ 144.6	$ 72.3
Geothermal	26.7	17.9
Geothermal Resources Development Fund	.1	.1
Hydropower	.5	---
Policy and Management	1.7	1.6
Subtotal	$ 173.6	$ 91.9
Use of Prior Year Balances and Other Adjustments	-1.0	-23.4
TOTAL, SOLAR AND OTHER RENEWABLES	$ 172.6	$ 68.5

Solar Energy

The FY 1987 solar energy program request of $72.3 million will support generic and long-range research in a wide variety of alternative energy technologies, structured to provide a sound base from which industry can draw particular applications. The major areas being investigated, as in past years, are moderate and high-temperature solar heat, photovoltaics, biofuels, wind, and solar building technologies. The main research topics being pursued at universities and national laboratories within these application areas are materials sciences, aerodynamic/fluid-dynamic modeling, and thermodynamic cycles. Industry will be involved in applied research in these areas. In addition, funds are provided for technology transfer and international cooperative activities, generic resource assessments, and capital improvements at the Solar Energy Research Institute.

Geothermal

The goal of the Geothermal Program is to help build a technology base that will enable the private sector to develop the various forms of geothermal resources economically. The FY 1987 request will support a program to include a balance between longer-term research and development and the more targeted development of technologies that serve to assist industry in meeting near-term technical objectives. Many of the research and development activities are designed to remove the technical and economic barriers associated with the widespread use of geothermal resources by the private sector.

Geothermal Resources Development Fund

The Geothermal Resources Development Fund was established to assist the development and utilization of geothermal energy through loan guarantees which induce allocation of private credit to geothermal projects. FY 1987 funds will be used for DOE personnel to monitor, and, when required, restructure outstanding loan guaranty agreements, in addition to processing pending loan guaranty applications. There are eight loan guarantees outstanding with a total face amount of $244.4 million.

Hydropower

Since 1977 the Department has invested more than $70 million in the Small-Scale Hydropower Program. The program's activities have succeeded in providing a technology base to industry for use in its decision-making process, and development can now be turned over to the private sector. Therefore, no funds are requested for FY 1987.

ELECTRIC ENERGY SYSTEMS AND STORAGE

The 1987 electric energy systems program will support basic engineering work in electromagnetic pulse (EMP) effects and new materials for efficient electrical power transmission; biomedical research on the effects of electric fields; utility reliability; and automation studies. The 1987 energy storage program will continue its generic research into electrochemistry for a variety of battery types, and in thermal and hydrogen chemical energy storage. The battery work includes research in electrochemical materials, sodium/sulphur battery development and metal-air cells.

ELECTRIC ENERGY SYSTEMS AND STORAGE	Budget Authority (in millions) FY 1986 Approp.	FY 1987 Request
Electric Energy Systems	$ 11.5	$ 7.6
Energy Storage Systems	17.3	8.6
TOTAL, ELECTRIC ENERGY SYSTEMS AND STORAGE	$ 28.8	$ 16.2

WEAPONS RESEARCH, DEVELOPMENT AND TESTING

The Research, Development and Testing program objectives include designing, testing, and certifying new weapons; advancing the state-of-the-art of weapons technology; and monitoring the nuclear weapons stockpile to assure continued reliability and effectiveness. The FY 1987 budget request of $2,101.2 million provides increases for continuing the Strategic Defense Initiative while maintaining a strong research and development technology base. Weapons physics applications of inertial confinement fusion will continue to be conducted with other technology base activities.

NAVAL REACTORS DEVELOPMENT

The Naval Reactors Development program carries out nuclear propulsion development work essential to the U.S. Navy. Nuclear powered ships provide the Navy operational flexibilities not possible with fossil fueled ships. In FY 1987, the requested amount for this program is $593.6 million. These funds will provide for the design, development, testing and evaluation of improved Naval nuclear propulsion plants and reactor cores which will improve the performance and enhance safe operation of existing and future nuclear powered ships. To achieve these improvements, advances are sought in propulsion plant quieting, lifetime, survivability, and power.

Major programs include an Advanced Fleet Reactor which will concentrate many of the current advances in reactor concepts, components and materials to power a new generation of nuclear powered attack submarines; a Modified Fuel Process for use in providing advanced fuel elements which will increase reactor core life and power; and a Developmental Materials Core to test improved reactor fuel, materials, and configurations intended to provide improved plant performance. Efforts will continue to develop and test advanced materials for use in reactor plant components and cores and develop and evaluate advanced reactor plant concepts.

Additional effort is being devoted to improving existing plants. This is necessary as the number and average age of nuclear powered warships grows. This work includes evaluating and understanding material and nuclear performance, as well as long term phenomena. Operating data obtained from equipment in the fleet are a valuable source for new development.

DEFENSE PRODUCTION AND SUPPORT

The Department of Energy supports the national defense through production of nuclear weapons and materials in response to Department of Defense requirements. Other responsibilities include the development of improved safeguards and security systems for nuclear weapons, materials and facilities, support for the verification of nuclear test treaty compliance and security investigations. The budget request for each element is as follows:

	Budget Authority (in millions)	
DEFENSE PRODUCTION AND SUPPORT	FY 1986 Estimate	FY 1987 Request
Weapons Production	$2,381.1	$2,562.8
Materials Production	1,768.1	2,066.1
Verification and Control Technology	94.3	101.7
Nuclear Safeguards and Security	57.1	66.9
Security Investigations	32.2	33.3
TOTAL, DEFENSE PRODUCTION AND SUPPORT	$4,332.8	$4,830.8

WEAPONS PRODUCTION

The goal of the Weapons Production and Surveillance program is to provide for the production of all U.S. nuclear weapons as authorized by the President; the maintenance of reliable weapons for their stockpile life; and the retirement and disposal of nuclear weapons from the stockpile. The following table summarizes the FY 1987 funding request:

	Budget Authority (in millions)	
WEAPONS PRODUCTION	FY 1986 Estimate	FY 1987 Request
Production and Surveillance	$2,286.0	$2,502.2
Program Direction	95.1	60.6
TOTAL, WEAPONS PRODUCTION	$2,381.1	$2,562.8

The objective of the Production and Surveillance program is to produce and deliver new warheads, projectiles, and bombs for the nuclear weapons stockpile; maintain modern manufacturing capabilities for the future production of weapons; and maintain the nuclear weapons stockpile in a high state of readiness and reliability. The weapons in production include the B61-3 Bomb, B61-4 Bomb, W76 Trident, W80-0 Sea Launched Cruise Missile Warhead, W80-1 Air Launched Cruise Missile Warhead, B-83 Bomb, W84 Ground Launched Cruise Missile Warhead, and the W87 Peacekeeper Warhead. Also included are pre-production efforts which will be conducted in FY 1987 for the W81 Standard Missile-2, the W82 155mm Artillery Fired Atomic Projectile, and the W88 Trident II Warhead, as well as for 8 other systems scheduled to begin production after 1989. Funding is also requested to maintain and rehabilitate facilities throughout the weapons production complex. Total requested FY 1987 funding for the Production and Surveillance program is $2,502.2 million.

Weapons Activities Program Direction funds the Federal staffing required for the management of the weapons program, including the Office of the Assistant Secretary for Defense Programs and the Office of Military Application. Also included is the Community Assistance program which helps support the community of Los Alamos, New Mexico, where a significant proportion of the residents are employed by the Department. The FY 1987 budget request is $60.6 million.

MATERIALS PRODUCTION

The Materials Production program supports the production of nuclear materials for use in the national security programs, including the Naval Reactors program. Nuclear materials, in small quantities, are also produced for DOE reactor research and development programs, other Government agencies, industries, and foreign governments under civilian international cooperation agreements. The following table provides additional detail about the budget request:

	Budget Authority (in millions)	
MATERIALS PRODUCTION	FY 1986 Estimate	FY 1987 Request
Reactor Operations	$ 580.9	$ 669.9
Processing of Nuclear Materials	497.8	564.2
Supporting Services	388.0	478.5
Enriched Material	169.6	204.5
Capital Equipment	109.5	126.1
Program Direction	22.3	22.9
TOTAL, MATERIALS PRODUCTION	$1,768.1	$2,066.1

The budget request of $2,066.1 million provides for operation of a reactor feed material production complex; production reactors at Savannah River and Richland; spent fuel chemical processing plants at Savannah River, Richland and Idaho; research and development efforts on long-range alternatives for the production of nuclear materials; and support facilities integral to the operation of the program.

VERIFICATION AND CONTROL TECHNOLOGY

This program supports the development and execution of U.S national security and foreign policy in the areas of treaty verification, intelligence, arms control, and export control as they relate to nuclear weapons issues. Major activities in FY 1987 include continued satellite sensor development and treaty verification. The budget request of $101.7 million will also continue development of the technology base for seismic, nonseismic, on-site monitoring and sample analysis activities.

NUCLEAR SAFEGUARDS AND SECURITY

The Nuclear Safeguards and Security program is responsible for developing measures to assure adequate protection of the Department's nuclear weapons, nuclear materials, facilities, and classified information against theft and sabotage. This activity is part of a much larger effort affecting all program areas to upgrade security at the Department's facilities. The program also provides safeguards-related technical support to U.S. and international nonproliferation activities. FY 1987 program objectives emphasize improved effectiveness of safeguards and security through guard forces training, and technical assistance for required improvements at the Department's facilities to counteract the insider threat of sabotage and diversion of special nuclear material, and demonstrate advanced integrated concepts at selected sites. Efforts will continue in support of classification activities, development of international safeguards, training of foreign safeguards personnel, tracking of nuclear materials shipments, and development of technology in physical protection and material accounting. Requested FY 1987 funding is $66.9 million.

SECURITY INVESTIGATIONS

The objective of the Security Investigations program is to insure that the common defense and security of the United States will not be endangered by granting security clearances to all DOE and DOE contractor personnel who must, in the performance of their work, have access to Restricted Data, a designated Critical Sensitive position. Recent clearance support has been sufficient to provide for DOE and contractor needs. Approximately 30,764 security investigations will be performed in FY 1987, a slight increase from FY 1986. Security investigations are performed for DOE by the Office of Personnel Management and the Federal Bureau of Investigation. Funding requested for this effort in FY 1987 is $33.3 million.

WASTE ACTIVITIES

Safe storage, handling and disposal of civilian and defense nuclear waste and cleanup of contaminated facilities has long been a prominent element of the Department's nuclear and defense programs. With the passage of the Nuclear Waste Policy Act of 1982, funds available for permanent disposal of civilian spent nuclear fuel and high-level waste increased significantly. The specific programs included in the category of Waste Activities involve high and low-level waste originating from civilian and defense sources. The total budget request for these activities in FY 1987 is $1,774.3 million, and the individual programs are described below. It should be noted that fees estimated to total $423.0 million in FY 1987 are paid into a special account in the Treasury by civilian owners or generators of high level nuclear waste and spent fuel to finance the Department's efforts to develop geologic repositories for high-level waste.

WASTE ACTIVITIES	Budget Authority (in millions) FY 1986 Estimate	Budget Authority (in millions) FY 1987 Request
Civilian Radioactive Waste Research and Development	$ 16.1	$ 6.5
Nuclear Waste Fund	499.0	769.3
Remedial Action and Waste Technology	230.1	294.1
Defense Waste Management	618.4	704.4
TOTAL, WASTE ACTIVITIES	$1,363.6	$1,774.3

CIVILIAN RADIOACTIVE WASTE RESEARCH AND DEVELOPMENT

The Civilian Radioactive Waste Research and Development program has been comprised of generic research and cooperative agreement activities that are consistent with the Nuclear Waste Policy Act of 1982, Public Law 97-425. These activities are managed by the Office of Civilian Radioactive Waste Management, which also manages activities under the Nuclear Waste Fund.

The FY 1987 Request of $6.5 million for spent fuel storage development provides only for encouraging and expediting the availability of licensed new at-reactor storage technologies. The program's efforts are to utilize all means directed or available through the Act or other authority to encourage and expedite the most efficient use of existing storage facilities and the addition of new capacity in a timely fashion at civilian nuclear power reactor sites.

NUCLEAR WASTE FUND

The Nuclear Waste Policy Act of 1982 established the Nuclear Waste Fund. The goal of the Nuclear Waste fund program is to isolate permanently defense and civilian high-level radioactive waste and spent fuel by placing them in a geologic repository. The Nuclear Waste fund program includes activities in the following major areas: geologic repositories, monitored retrievable storage, transportation and systems integration, and program management and technical support.

	Budget Authority (in millions) FY 1986 Estimate	Budget Authority (in millions) FY 1987 Request
Nuclear Waste Fund	$ 499.0	$ 769.3

The increased FY 1987 request will provide for extensive site characterization to obtain technical data to support licensing application to NRC, continued exploratory shaft design and construction, and intensive engineering tests and analyses to support the waste package and repository designs for the first repository. These activities will be conducted at each of the three candidate repository sites. The increase will also provide support for the continuation of site field investigations and design for the second repository as mandated by the Act.

The Nuclear Waste Fund programs are financed from a special receipt account in the Treasury of the United States. This special account receives all of the revenue the Department collects from owners and generators of civilian high-level nuclear waste.

Through the appropriation process, Congress makes funds available to the Department to carry out these programs. Obligations incurred under this authority are liquidated from cash balances in the Fund. To the extent balances in the Fund are insufficient to cover maturing obligations, DOE can borrow from the Treasury. Conversely, any excess cash balances over program requirements may be invested in Treasury obligations. A projection of fees to finance the Fund through FY 1989 is as follows:

Projected Annual Fee Revenues
(Dollars in Millions)

Actual FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
$1,794.8[a/]	$380.9	$423.0	$491.7	$526.1

[a/] Includes one-time payment

REMEDIAL ACTION AND WASTE TECHNOLOGY

The objectives of the Remedial Action and Waste Technology program are to treat or stabilize radioactive waste and perform decontamination and decommissioning at contaminated DOE and legislatively authorized non-government facilities and sites; facilitate development of a reliable national system for managing low-level radioactive waste; and develop acceptable technologies for the treatment and immobilization of all types of nuclear waste. The major activities include: (1) the formerly utilized sites remedial action project; (2) remedial action at Grand Junction, Colorado; (3) the uranium mill tailings remedial action project for inactive uranium mill tailings sites; (4) management and disposition of certain civilian radioactively contaminated DOE surplus facilities; (5) demonstration of the solidification of high-level radioactive waste in a form suitable for final disposal at the former reprocessing facility at West Valley, New York; (6) technical assistance to States and regions to assist them in developing new capacities for the disposal of low level waste; and (7) civilian byproducts utilization and applications with primary emphasis on food irradiation. The distribution of funding for this program is shown below:

	Budget Authority (in millions)	
REMEDIAL ACTION AND WASTE TECHNOLOGY	FY 1986 Estimate	FY 1987 Request
Formerly Utilized Sites	$ 18.9	$ 25.6
Grand Junction Remedial Action	.9	.8
Uranium Mill Tailings Sites	91.4	126.0
Surplus Facilities	39.9	56.4
West Valley Demonstration Project	61.6	79.0
Low Level Waste	4.6	4.0
Waste Treatment	6.2	---
Byproducts Utilization	4.8	---
Program direction	1.8	2.3
TOTAL, REMEDIAL ACTION AND WASTE TECHNOLOGY	$ 230.1	$ 294.1

DEFENSE WASTE MANAGEMENT

The goal of the Defense Waste Management program is to provide for safe interim storage or utilization of radioactive waste and byproducts generated primarily from nuclear materials production and naval propulsion while continuing the development of technologies and facilities for the final disposal of defense waste. The program has three primary elements: Interim Waste Operations, Long-Term Waste Management Technology, and Terminal Storage. These elements provide mainly for the handling and disposal of low-level radioactive waste, the storage of transuranic and high-level waste, development of technology for the long-term management of radioactive waste, and the demonstration of the safe disposal of defense waste.

DEFENSE WASTE MANAGEMENT	Budget Authority (in millions) FY 1986 Estimate	FY 1987 Request
Interim Waste Operations	$ 321.7	$ 401.3
Long-Term Waste Management Technology	245.2	223.8
Terminal Storage	15.4	39.1
Capital Equipment	33.7	37.8
Program Direction	2.4	2.4
TOTAL, DEFENSE WASTE MANAGEMENT	$ 618.4	$ 704.4

Fiscal year 1987 efforts will continue the upgrading of waste handling, storage, and disposal operations by transferring high-level waste from old single-shell tanks at Savannah River and Hanford into new double-shell tanks; construction and operation of new facilities; improvement of existing facilities; upgrading of burial ground operations; continuation of activities to enhance safety, security and protection of the environment; and the management of defense surplus facilities. The long-term program in FY 1987 will focus on continued construction of the Defense Waste Processing Facility at the Savannah River Plant, and preparation for operation of the Waste Isolation Pilot Plant at Carlsbad, New Mexico.

BUSINESS ENTERPRISES

A number of the Department's principal activities resemble business enterprises in that they sell products to customers and generate revenues, or, as in the case of the Strategic Petroleum Reserve, secure and maintain an inventory of oil which could be sold to petroleum refiners in the event of a major supply disruption.

A major policy initiative of the FY 1987 budget is to take steps to sell several of these enterprises to the private sector. However, full funding for FY 1987 is requested, and is reflected in the following table.

	Budget Authority (in millions)	
BUSINESS ENTERPRISES	FY 1986 Estimate	FY 1987 Request
Direct Energy Production	$ 941.4	$ 787.1
Strategic Petroleum Reserve	378.2	150.0
Subtotal	$1,319.6	$ 937.1
Use of Prior Year Balances and Other Adjustments	-450.2	-245.7
TOTAL, BUSINESS ENTERPRISES	$ 869.4	$ 691.4

DIRECT ENERGY PRODUCTION

The Department markets energy products in three program areas: enriched uranium produced for domestic and international customers; oil and other petroleum products, including natural gas, produced from the Naval Petroleum Reserves; and electric power produced by Federal hydropower projects. Revenues from the sale of enriched uranium are directly offset against production costs. The revenues generated from the sale of power from four of the five Power Marketing Administrations and from the sale of oil and related petroleum products from the Naval Petroleum Reserves are deposited directly to the Treasury and do not reduce the Department's need for budget authority to support program operations. Revenues from these sources in FY 1987 are estimated to be $1,702 million; $690 million of power marketing revenues, and $1,012 million of Naval Petroleum and Oil Shale Reserves revenues. Bonneville Power Administration revenues are deposited in a revolving fund.

It is a goal of the administration to turn several of these business enterprises over to private ownership. Legislation authorizing the sale of the Naval Petroleum Reserves and privatization of the five Power Marketing Administrations will be proposed in 1986, but full funding for these organizations is included in the FY 1987 budget. It is assumed that the Naval Petroleum Reserves will sell at prices comparable to private oil field transactions, and that the Power Marketing Administrations would be sold for a fair return to the taxpayers. This will be determined by an open process with consideration for the views of all concerned groups and individuals. It is also assumed that future capacity development for Uranium Enrichment will be provided by the private sector.

Production and distribution costs, anticipated revenues, and net appropriation requirements for the Department's Direct Energy Production activities are as follow:

DIRECT ENERGY PRODUCTION	Budget Authority (in millions) FY 1986 Estimate	Budget Authority (in millions) FY 1987 Request
Production and Distribution Costs		
Uranium Enrichment	$ 1,550.4	$ 1,286.4
Less: Uranium Enrichment Revenues	-1,360.6	-1,286.4
Subtotal, Uranium Enrichment	$ 189.8	$ ---
Naval Petroleum and Oil Shale Reserves	168.9	163.6[a]
Power Marketing Administrations	582.7	623.5
Subtotal	$ 941.4	$ 787.1
Use of Prior Year Balances and Other Adjustments	-179.5	-95.7
TOTAL, DIRECT ENERGY PRODUCTION	$ 761.9	$ 691.4

Uranium Enrichment

The goal of the Uranium Enrichment activities program is to meet commercial and Government requirements for uranium enrichment services in the most economical, reliable, safe, secure, and environmentally acceptable manner possible.

The Department presently enriches uranium for United States and foreign utilities to the desired uranium-235 (U-235) product assay levels in its Gaseous Diffusion Plants (GDPs) located at Portsmouth, Ohio; and Paducah, Kentucky. These plants were built in the 1950's to satisfy defense requirements for highly enriched U-235. They are now operated primarily to provide enrichment services to domestic and non-U.S. utility customers. In these plants, the Department enriches customer-provided natural uranium in the U-235 component for a fee that recovers the cost of providing the service. The Department is the sole producer of enrichment services in the United States. In addition to satisfying contractual commitments, the Government realizes nonproliferation and balance of trade benefits from its enrichment activities.

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[a] Excludes proposed legislation concerning the privatization of the Naval Petroleum Reserves ($-78.8 million).

The principal objective of the uranium enrichment enterprise in FY 1987 is to conduct all activities in a manner that maximizes near-term and long-term competitiveness. Accordingly, emphasis is being put on minimizing the production cost for the GDP complex. The near term policy goal of the Atomic Vapor Laser Isotope Separation (AVLIS) program is to transfer development and ultimate deployment of the technology to the private sector. The details for determining private sector interest are currently under development.

Competition in the international uranium enrichment marketplace is becoming increasingly more intense, placing increased emphasis on the need to reduce program costs and selling prices. Consequently, the program will continue to close out the Gas Centrifuge Enrichment Plant (GCEP) project at Portsmouth, Ohio and the Advanced Gas Centrifuge (AGC) program at minimum cost; and maintain the GDP located at Oak Ridge, Tennessee in a standby condition because of projected defense demand for enrichment services in the outyears.

The DOE's charges for uranium enrichment services are based on recovery of the Government's costs over a reasonable period of time, in accordance with Section 161v of the Atomic Energy Act and with the Uranium Enrichment Services Criteria. In FY 1986 and FY 1987, sales are projected to remain low due to foreign competition and to customer workoff of inventories. The Department's success in rigorous cost cutting activities will allow the charge for each Separative Work Unit (SWU) to be reduced from $125 per SWU in FY 1986 to $119 per SWU in FY 1987.

In FY 1987, the Department is proposing to begin repayment of the unrecovered Federal investment in the uranium enrichment program. The unrecovered Federal investment is $7.5 billion. The Administration is proposing a writedown of $4 billion of this amount. The remaining $3.5 billion will be paid with interest. In FY 1987, $235 million in revenue collections will be returned to the Treasury in partial repayment of the unrecovered Federal investment.

Naval Petroleum and Oil Shale Reserves

The statutory objectives of the Naval Petroleum and Oil Shale Reserves (NPOSR) program are to explore, prospect, conserve, develop, use and operate the reserves; to produce Naval Petroleum Reserves Nos. 1, 2, and 3 (NPR 1, 2, and 3) at their maximum efficient rates; and to use, store or sell the products from the Reserves.

The FY 1987 budget request of $163.6 million is approximately the same level of funding as FY 1986, but with emphasis shifted more toward operation and maintenance activities and away from large development. Initial developmental drilling has been essentially completed in NPR 1 and 3, and the major emphasis in the drilling program is directed toward maintaining maximum efficient production of the reservoirs. Final funding is provided for offset wells to protect Naval Oil Shale Reserves No. 3 gas from migrating to private lands.

It is estimated that the Federal share of production in FY 1987 will be 91,000 barrels per day, with total production estimated at 116,000 barrels per day. Gross Federal revenues from NPOSR production, including Windfall Profits Taxes, are estimated at approximately $1.1 billion in FY 1987.

The budget assumes that the process of selling the government's interest in the three petroleum reserves to the private sector will be undertaken during FY 1987, and that production at their maximum efficient rates will be continued until the sales are completed. Funding is requested to conduct the program until the sale can be completed. The sale of the Reserves makes sense because the fields are likely to be operated more efficiently by the private sector than under Federal sponsorship.

Power Marketing Administrations

The Power Marketing Administrations (PMA) market electricity generated by Federal hydropower projects. Preference for sale of power is given to public bodies and cooperatives. Revenues from selling power and transmission services of the five PMA's offset annual operations and maintenance costs, repay the capital investment with interest and assist capital repayment on irrigation features of certain projects.

Although funds are included in the budget for operating the power marketing administrations in 1987, the Administration will actively seek to privatize these utility systems. Utilities are not normally a Federal responsibility, and non-Federal owners can operate the PMAs as effeciently, or more efficiently, than the Federal government.

The Administration will pursue privatization through an open process. It will be guided by the following principles: (1) seek a fair return to the Federal taxpayers from the privatization of these assets; (2) recognize the benefits currently enjoyed by existing customers; and (3) recognize and provide appropriate protections for the personnel benefits of Federal employees.

Before implementation of privatization, the Administration will seek the views of concerned groups and individuals, including Congressional delegations, State and local officials, current customers, the financial community, and public power and private sector energy interests.

It is expected that the Bonneville and Southwestern Power Administrations will be the first to be sold, probably in FY 1988, with all the PMAs having been transferred from Federal control by FY 1991. In the interim, the FY 1987 budget proposes to modify PMA capital investment repayment practices legislatively, consistent with sound business principles, to protect the interests of the Nation's taxpayers. These modifications require repayment of the unpaid balance of the original federal investment at a level not less than would be required under a fixed, straight-line amortization schedule for each power investment financed by appropriations and placed in service. This requirement would not apply to irrigation investments. The Bonneville Power Administration (BPA) bonds would continue to be repaid under the terms already negotiated between BPA and Treasury. Repayments of principal, if necessary, can be deferred, subject to the same terms and conditions applicable to deferred interest payments (e.g., current interest rates are used because the deferral helps finance current operations). The impact of this repayment proposal is relatively modest compared to the proposal made in last year's budget.

The FY 1987 budget request for the five PMAs is as follows:

POWER MARKETING ADMINISTRATIONS	Budget Authority (in millions) FY 1986 Estimate	Budget Authority (in millions) FY 1987 Request
Alaska	$ 3.2	$ 3.3
Bonneville (Borrowing Authority)	330.0	276.1
Southeastern	14.7	21.7
Southwestern	38.0	38.6
Western Area	196.8	283.8
Subtotal	$ 582.7	$ 623.5
Use of Prior Year Balances and Other Adjustments	-24.4	-59.2
TOTAL, POWER MARKETING ADMINISTRATIONS	$ 558.3	$ 564.3

The Alaska Power Administration (APA) markets power generated at two hydroelectric plants in Alaska. Power is marketed to achieve the most widespread use at the lowest possible rates consistent with sound business principles and repayment requirements. Discussion will be continued during FY 1987 about a possible transfer of APA facilities to the State of Alaska or other purchaser. Pending actual transfer to the State, full funding of $3.3 million has been requested for FY 1987.

The Bonneville Power Administration (BPA) operates on a self-financed revolving fund basis and does not require appropriations to finance its operations. However, it requires borrowing authority to finance transmission system construction, fund energy conservation and renewable energy resources development, and protect, mitigate, and enhance fish and wildlife affected by the development and operation of the hydroelectric facilities on the Columbia River and its tributaries. The FY 1987 borrowing authority request is $276.1 million.

The Southeastern Power Administration markets power generated at 22 hydroelectric generating plants in a 10-state area. Transmission facilities are owned by the region's transmitting utilities who provide wheeling services to Southeastern. Southeastern is requesting $21.7 million for operation and maintenance and purchase power and wheeling.

The Southwestern Power Administration markets and transmits power generated at 23 hydroelectric plants for delivery at the lowest possible rates to cooperatives, municipalities, Government installations, and private companies. Southwestern is requesting a total funding level of $38.6 million for operation and maintenance, purchase power and wheeling, and construction in FY 1987.

The Western Area Power Administration's budget request covers necessary construction and rehabilitation of power transmission facilities, extensive operation and maintenance activities for power marketing transmission functions in a 15-state area, and purchase power and wheeling expenses to meet contractual obligations and allow participation in the fuel replacement program. Western's activities are primarily financed through a combination of appropriated funds and revenue collections.

Western is requesting $84.0 million for construction, $86.1 million for operation and maintenance, and $113.7 million for purchase power and wheeling.

STRATEGIC PETROLEUM RESERVE

The creation of the Strategic Petroleum Reserve (SPR) was mandated by the Energy Policy and Conservation Act of 1975 to reduce the Nation's vulnerability to oil supply disruptions.

	Budget Authority (in millions)	
STRATEGIC PETROLEUM RESERVE	FY 1986 Estimate	FY 1987 Request
Storage Facilities Development	$ 362.5	$ 136.6
Management	15.7	13.4
Petroleum Acquisition and Transportation	---	---
Subtotal	$ 378.2	$ 150.0
Use of Prior Year Balances and Other Adjustments	-270.7	-150.0
TOTAL, STRATEGIC PETROLEUM RESERVE	$ 107.5	$ ---

The FY 1987 budget request proposes an indefinite moratorium on further development of the Strategic Petroleum Reserve. For maximum effect on outlay reduction, development was suspended on December 31, 1985. Fill activities will continue in FY 1986 until almost 500 million barrels of crude oil are in storage for use in the event of a supply emergency, an amount considered more than adequate in today's world energy environment. This moratorium will be reassessed as economic and oil market conditions change. The FY 1987 budget assumes that the SPR will be operated and maintained in a standby condition.

GRANTS AND OTHER ENERGY FUNCTIONS

A number of important functions of the Department of Energy do not fit the criteria established for research and development, defense production, waste activities, or business enterprises. However, these functions are an important part of overall Federal energy policy, and in some respects represent those aspects of the Department most likely to have a direct effect on States and individual citizens. They may be divided into two major groupings: Grants, which include four conservation programs, and Other Energy Functions, which include a number of planning, regulatory, and information programs.

	Budget Authority (in millions)	
GRANTS AND OTHER ENERGY FUNCTIONS	FY 1986 Estimate	FY 1987 Request
Conservation Grants	$ 256.6	$ 5.0
Other Energy Functions	129.4	108.5
TOTAL, GRANTS AND OTHER ENERGY FUNCTIONS	$ 386.0	$ 113.5

CONSERVATION GRANTS

The Conservation Grants program has provided funds to State and local governments to undertake energy conservation measures. The FY 1987 budget proposes no further Federal support for these programs. The States will be able to make use of very large sums specifically earmarked for conservation and other energy-related activities which are anticipated to be made available to the States in the settlement of oil pricing and allocation violations. Under these circumstances, continued use of appropriated funds is no longer necessary, except for $5.0 million in program direction for the orderly close-out of Federal responsibilities. The States will have adequate resources from these settlements and can direct funds to such programs.

	Budget Authority (in millions)	
CONSERVATION GRANTS	FY 1986 Estimate	FY 1987 Request
Energy Policy Conservation Act (EPCA)	$ 17.5	$ ---
Energy Extension Service (EES)	7.3	---
Weatherization	177.9	---
Schools and Hospitals	43.9	---
Territories Assistance	0.5	---
Program Direction	9.5	5.0
TOTAL, CONSERVATION GRANTS	$ 256.6	$ 5.0

OTHER ENERGY FUNCTIONS

The Department performs such other energy functions as planning for energy emergencies, collecting and analyzing energy information, and performing certain regulatory functions. The budget request for these activities is shown below:

OTHER ENERGY FUNCTIONS	Budget Authority (in millions) FY 1986 Estimate	Budget Authority (in millions) FY 1987 Request
Emergency Preparedness	$ 5.7	$ 6.0
Energy Information Administration	57.7	59.7
Economic Regulatory Administration	18.1	16.9
Office of Hearings and Appeals	5.3	5.0
Federal Energy Regulatory Commission	42.0	20.3
Payments to States [1]	.6	.6
TOTAL, OTHER ENERGY FUNCTIONS	$ 129.4	$ 108.5

Emergency Preparedness

Market forces will be relied upon as the principal response mechanism in an energy emergency. To supplement the operation of the market, the Emergency Preparedness program provides an ongoing capability for the coordination of effective energy emergency preparedness activities designed to help reduce the vulnerability of the Nation to energy supply disruptions.

The budget request for FY 1987, $6.0 million, will provide for energy security analyses and assessments, development and support of a wide range of defense energy emergency preparedness activities, and continued support for international energy security activities, particularly those involving NATO and the International Energy Agency.

Energy Information Administration

The goal of the Energy Information Administration (EIA) is to produce and provide relevant, timely, and accurate energy information to the Executive Branch, Congress, State governments, and the public as an aid to decisionmakers in all sectors of society. To accomplish this, EIA collects, processes, and interprets energy data and exercises independent judgement in the gathering, analysis and dissemination of information.

The FY 1987 budget request of $59.7 million will continue operation of basic energy data collection programs and publication of periodic energy statistical reports and forecasts. Basic energy information support to other components of the Department, such as the Federal Energy Regulatory Commission and the Office of Civilian Radioactive Waste Management, will continue on a reimbursable basis.

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[1] Permanent, indefinite appropriation.

Economic Regulatory Administration

In FY 1987 the primary activity of the Economic Regulatory Administration (ERA) will be to resolve, by settlement or litigation, the remaining cases of alleged pricing violations of the Emergency Petroleum Allocation Act of 1973, which occurred prior to decontrol of oil in January 1981.

The FY 1987 budget request of $16.9 million assumes that most petroleum compliance activities will be substantially completed by the end of FY 1988, and that the Fuels Use Act will be repealed during FY 1986, thus permitting termination of the Fuels Conversion program. The allowance provides funds for technical and analytic support for processing import/export applications for natural gas and electricity, and for coordination with related regulatory activities of the Federal Energy Regulatory Commission (FERC).

Office of Hearings and Appeals

The Office of Hearings and Appeals (OHA) is responsible for all the Department's adjudicatory processes other than those administered by the FERC or the Board of Contract Appeals. The OHA reviews and decides exception applications from individual firms or persons who believe that a Department-issued rule, regulation, or order results in a serious hardship, gross inequity or unfair distribution of burdens. The Office is also responsible for deciding final appeals in matters under the jurdisdiction of the Secretary. In the enforcement area, OHA provides an adjudicatory forum to consider contested issues of fact and law prior to the issuance of a final Remedial Order, and administers refund proceedings involving funds obtained as a direct result of petroleum enforcement and settlement actions. The FY 1987 request is $5.0 million, and assumes that OHA will be able to close almost all compliance matters involving petroleum pricing and allocation regulations by the end of FY 1989.

Federal Energy Regulatory Commission

The Federal Energy Regulatory Commission is responsible for regulating the national operations of natural gas companies, oil pipelines, hydroelectric projects, and electric utilities to ensure that businesses and consumers have adequate energy supplies at just and reasonable rates and for allowing the jurisdictional companies fair rates of return to provide incentives for increased production of energy supplies. The Commission has jurisdiction over 9,700 natural gas producers, 150 natural gas pipeline companies, more than 1,400 hydropower projects, 150 oil pipeline companies, and 214 electric utilities. The FY 1987 funding request of $99.1 million is to be offset by fees, annual charges, and other revenues estimated at $78.8 million, providing a net budget request of $20.3 million. The net budget request for FERC is less than half the FY 1986 level due to increased revenues in FY 1987.

DEPARTMENTAL MANAGEMENT

This category includes general management and support activities benefiting all elements of the Department of Energy. The budget request totals $151.1 million, and is distributed in the following manner:

DEPARTMENTAL MANAGEMENT	Budget Authority (in millions) FY 1986 Estimate	Budget Authority (in millions) FY 1987 Request
Office of the Secretary	$ 1.6	$ 1.9
Board of Contract Appeals	.4	.3
Inspector General	18.2	21.1
General Counsel	9.7	10.0
Management and Administration	121.5	140.1
Operations Offices	88.8	94.2
Office of Minority Economic Impact	2.6	1.8
Policy, Planning and Analysis	7.5	7.9
Congressional, Intergovernmental and Public Affairs	5.1	4.9
International Affairs	4.6	5.8
Subtotal	$ 260.0	$ 288.0
Cost of Work for Others	143.5	115.0
Revenues	-244.2	-251.9
Subtotal	$ 159.3	$ 151.1
Use of Prior Year Balances and Other Adjustments	-9.0	---
TOTAL, DEPARTMENTAL MANAGEMENT	$ 150.3	$ 151.1

The Office of the Secretary assures the formulation, implementation and articulation of energy policies, regulations and legislation. The Board of Contract Appeals resolves contract disputes between the Department and its contractors. The General Counsel provides legal opinions, advice, and legislative drafting services to all Departmental programs except the Federal Energy Regulatory Commission. The Office of the Inspector General undertakes audits, inspections, and investigations of DOE programs and operations to ensure compliance with the applicable laws and regulations and to guard against possible waste, fraud, and mismanagement.

Management and Administration provides the essential management and administrative services necessary to support the Department's programs and missions in the most efficient, effective and economical manner. The Operations Offices manage and execute Headquarters-delegated program and project responsibilities in the field. The Office of Minority Economic Impact advises how the Department's programs, policies and regulations affect minorities; conducts an on-going research program; provides management and technical assistance to minority businesses and to minority educational institutions; and provides financial assistance in the form of loans to minority businessess. The Office of Policy, Planning, and Analysis acts as the principal staff advisor to the Secretary in the review of existing and prospective energy policies; provides objective policy analysis and evaluation within the Department; and carries out studies mandated by Congress.

The Office of Congressional, Intergovernmental and Public Affairs coordinates Departmental relations with Congress; the news media; State, territorial, tribal, and local governments; other Federal agencies; consumer, citizen, labor and business organizations; education organizations; energy-oriented groups; and the general public. This office also fosters and assures competition in the energy industry. The Office of International Affairs is responsible for coordinating the development of international energy technology cooperation, developing policies for energy related trade issues based on analyses of strategic and economic factors, developing and implementing international nuclear non-proliferation policies, and managing U.S./DOE participation in international energy emergency planning.

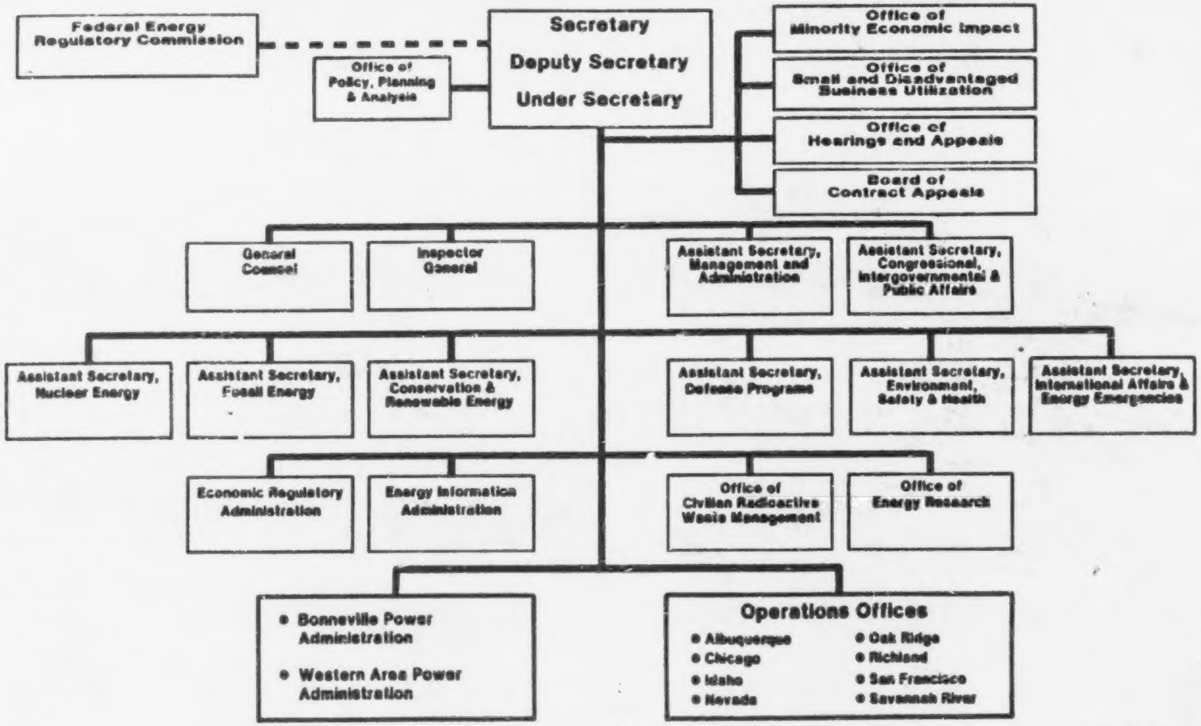
Cost of Work for Others represents the full cost of products and services provided by the Department to qualified non-DOE users. The Department collects revenues as offsets to the Cost of Work for Others program and in payment for other products and services provided.

APPENDICES

APPENDIX C

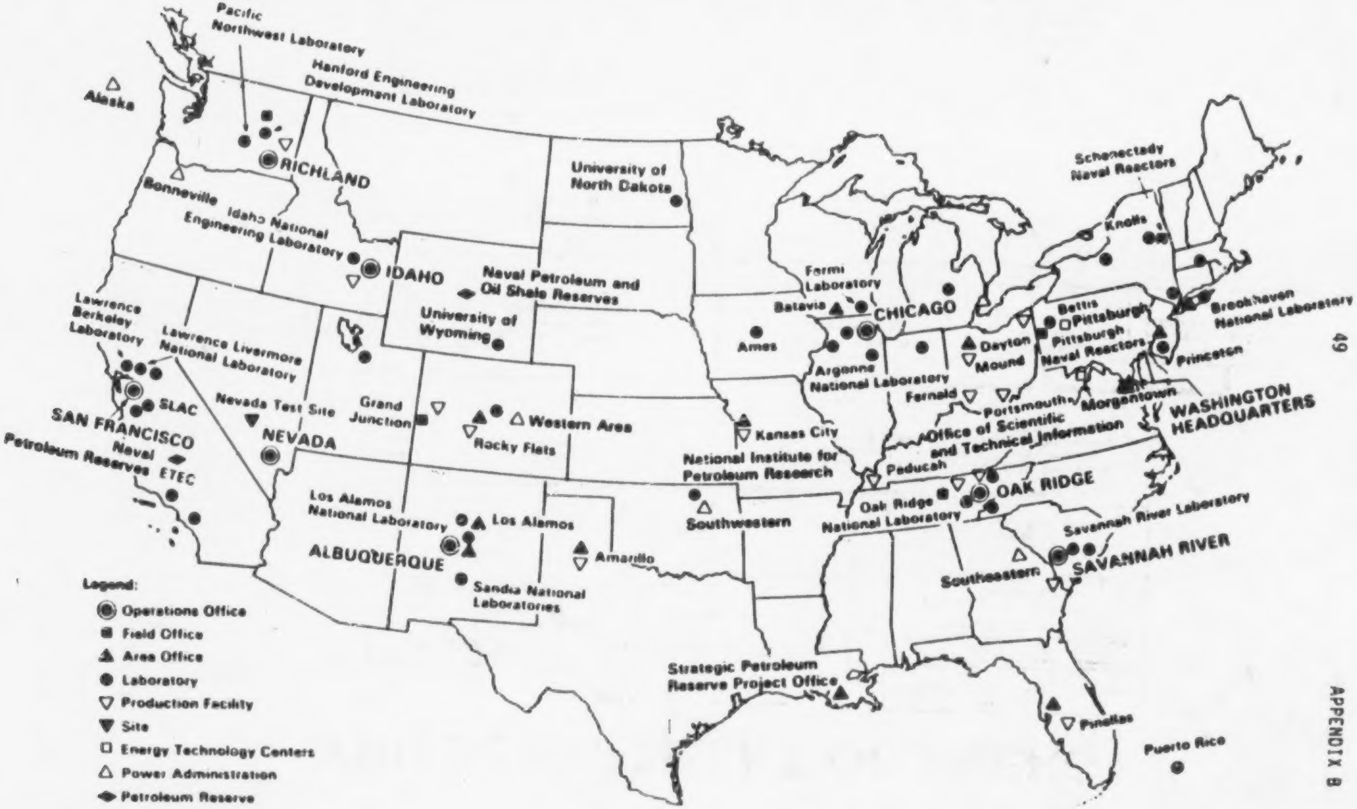
BUDGET BY APPROPRIATION

THE DEPARTMENT OF ENERGY


Federal Energy Regulatory Commission
Secretary
Deputy Secretary
Under Secretary
Office of Policy, Planning & Analysis
Office of Minority Economic Impact
Office of Small and Disadvantaged Business Utilization
Office of Hearings and Appeals
Board of Contract Appeals
General Counsel
Inspector General
Assistant Secretary, Management and Administration
Assistant Secretary, Congressional, Intergovernmental & Public Affairs
Assistant Secretary, Nuclear Energy
Assistant Secretary, Fossil Energy
Assistant Secretary, Conservation & Renewable Energy
Assistant Secretary, Defense Programs
Assistant Secretary, Environment, Safety & Health
Assistant Secretary, International Affairs & Energy Emergencies
Economic Regulatory Administration
Energy Information Administration
Office of Civilian Radioactive Waste Management
Office of Energy Research
• Bonneville Power Administration
• Western Area Power Administration
Operations Offices
• Albuquerque
• Chicago
• Idaho
• Nevada
• Oak Ridge
• Richland
• San Francisco
• Savannah River

January 1986

MAP OF DOE FIELD FACILITIES AND OPERATIONS


Pacific Northwest Laboratory
Hanford Engineering Development Laboratory
Alaska
RICHLAND
Bonneville
Idaho National Engineering Laboratory
IDAHO
Naval Petroleum and Oil Shale Reserves
University of Wyoming
University of North Dakota
Lawrence Berkeley Laboratory
Lawrence Livermore National Laboratory
SLAC
SAN FRANCISCO
Naval Petroleum Reserves
ETEC
Nevada Test Site
NEVADA
Grand Junction
Western Area
Rocky Flats
Los Alamos National Laboratory
Los Alamos
ALBUQUERQUE
Sandia National Laboratories
Amarillo
Kansas City
National Institute for Petroleum Research
Southwestern
Strategic Petroleum Reserve Project Office
Ames
Fermi Laboratory
Batavia
CHICAGO
Argonne National Laboratory
Dayton
Mound
Fernald
Portsmouth
Bettis
Pittsburgh
Pittsburgh Naval Reactors
Morgantown
Office of Scientific and Technical Information
Paducah
Oak Ridge National Laboratory
OAK RIDGE
Savannah River Laboratory
SAVANNAH RIVER
Southeastern
Pinellas
Puerto Rico
Schenectady Naval Reactors
Knolls
Brookhaven National Laboratory
Princeton
WASHINGTON HEADQUARTERS
Legend:
◉ Operations Office
■ Field Office
▲ Area Office
● Laboratory
▽ Production Facility
▼ Site
□ Energy Technology Centers
△ Power Administration
◆ Petroleum Reserve

DEPARTMENT OF ENERGY
FY 1987 BUDGET
(BUDGET AUTHORITY IN THOUSANDS OF DOLLARS)

PROGRAMS FUNDED BY ENERGY AND
WATER DEVELOPMENT APPROPRIATIONS

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

	FY 1986 ESTIMATE	FY 1987 REQUEST
SOLAR AND OTHER RENEWABLES		
SOLAR BUILDINGS ENERGY SYSTEMS.......	8,181	4,700
PHOTOVOLTAIC ENERGY SYSTEMS..........	40,678	20,600
SOLAR THERMAL ENERGY SYSTEMS.........	25,885	15,300
BIOFUELS ENERGY SYSTEMS..............	27,326	12,200
WIND ENERGY SYSTEMS..................	24,825	8,250
OCEAN ENERGY SYSTEMS.................	4,811	2,500
INTERNATIONAL SOLAR ENERGY PROGRAM...	962	500
SOLAR TECHNOLOGY TRANSFER............	2,983	2,000
SOLAR ENERGY RESEARCH INSTITUTE......	2,244	545
PROGRAM SUPPORT......................	1,251	897
RESOURCE ASSESSMENT..................	962	700
PROGRAM DIRECTION OTHER SOLAR ENERGY.	4,516	4,100
SUBTOTAL, SOLAR ENERGY.............	144,624	72,292
GEOTHERMAL...........................	26,681	17,930
HYDROPOWER...........................	481	---
ELECTRIC ENERGY SYSTEMS..............	11,548	7,619
ENERGY STORAGE SYSTEMS...............	17,292	8,600
NUCLEAR ACTIVITIES		
NUCLEAR ENERGY R&D	375,684	330,900
REMEDIAL ACTION AND WASTE TECHNOLOGY	230,047	294,100

DEPARTMENT OF ENERGY
FY 1987 BUDGET
(BUDGET AUTHORITY IN THOUSANDS OF DOLLARS)

PROGRAMS FUNDED BY ENERGY AND WATER DEVELOPMENT APPROPRIATIONS

ENERGY SUPPLY RESEARCH AND DEVELOPMENT (CONTINUED)

	FY 1986 ESTIMATE	FY 1987 REQUEST
CIVILIAN WASTE R&D..................	16,064	6,500
ENVIRONMENT, SAFETY, AND HEALTH......	46,921	76,098
BIOLOGICAL AND ENVIRONMENTAL RESEARCH........................	179,950	196,565
LIQUIFIED GASEOUS FUELS SPILL TEST FACILITY..........................	1,732	1,200
MAGNETIC FUSION.....................	365,469	333,000
BASIC ENERGY SCIENCES...............	433,770	441,370
ENERGY RESEARCH ANALYSIS............	2,598	3,550
UNIVERSITY RESEARCH INSTRUMENTATION..	6,254	5,000
UNIVERSITY RESEARCH SUPPORT..........	10,296	10,975
ADVISORY AND OVERSIGHT PROGRAM DIRECTION..........................	2,674	2,900
MULTI-PROGRAM LABORATORIES FACILITIES SUPPORT.................	39,824	60,190
IN-HOUSE ENERGY MANAGEMENT...........	11,709	16,500
TECHNICAL INFORMATION AND MANAGEMENT PROGRAM............................	12,413	10,775

DEPARTMENT OF ENERGY
FY 1987 BUDGET
(BUDGET AUTHORITY IN THOUSANDS OF DOLLARS)

PROGRAMS FUNDED BY ENERGY AND WATER DEVELOPMENT APPROPRIATIONS

ENERGY SUPPLY RESEARCH AND DEVELOPMENT (CONTINUED)

	FY 1986 ESTIMATE	FY 1986 REQUEST
POLICY AND MANAGEMENT - ER..........	84	550
POLICY AND MANAGEMENT - NE..........	1,732	1,810
POLICY AND MANAGEMENT - CE..........	1,681	1,527
SUBTOTAL, ENERGY SUPPLY R&D.......	1,939,528	1,899,951
USE OF PRIOR YEAR BALANCES AND OTHER ADJUSTMENTS.........................	-243,230	-645,789
TOTAL, ENERGY SUPPLY R&D - B/A.......	1,696,298	1,254,162

URANIUM ENRICHMENT

	FY 1986 ESTIMATE	FY 1986 REQUEST
URANIUM ENRICHMENT ACTIVITIES........	1,546,350	1,281,600
URANIUM PROGRAM DIRECTION............	4,036	4,800
SUBTOTAL, URANIUM ENRICHMENT.......	1,550,386	1,286,400
REVENUES............................	-1,360,600	-1,286,400
SUBTOTAL, URANIUM ENRICHMENT	189,786	---
USE OF PRIOR YEAR BALANCES AND OTHER ADJUSTMENTS	726	---
TOTAL, URANIUM ENRICHMENT - B/A	190,512	---

GENERAL SCIENCE AND RESEARCH

	FY 1986 ESTIMATE	FY 1986 REQUEST
HIGH ENERGY PHYSICS..................	494,858	546,700
NUCLEAR PHYSICS......................	164,472	224,200
HIGH ENERGY AND NUCLEAR PHYSICS PROGRAM DIRECTION..................	2,092	2,500
SUBTOTAL, GENERAL SCIENCE AND RESEARCH.........................	661,422	773,400
USE OF PRIOR YEAR BALANCES AND OTHER ADJUSTMENTS	-5,494	---
TOTAL, GENERAL SCIENCE AND RESEARCH - B/A................................	655,928	773,400

DEPARTMENT OF ENERGY
FY 1987 BUDGET
(BUDGET AUTHORITY IN THOUSANDS OF DOLLARS)

PROGRAMS FUNDED BY ENERGY AND WATER DEVELOPMENT APPROPRIATIONS

ATOMIC ENERGY DEFENSE ACTIVITIES

	FY 1986 ESTIMATE	FY 1987 REQUEST
WEAPONS ACTIVITIES:		
RESEARCH, DEVELOPMENT AND TESTING..	1,705,899	2,077,400
INERTIAL CONFINEMENT FUSION	23,868	23,800
PRODUCTION AND SURVEILLANCE........	2,285,953	2,502,204
PROGRAM DIRECTION - DEFENSE PROGRAMS.................	95,100	60,550
SUBTOTAL, WEAPONS ACTIVITIES ...	4,110,820	4,663,954
MATERIALS PRODUCTION.................	1,768,149	2,066,146
DEFENSE WASTE AND BY-PRODUCTS MANAGEMENT..........................	618,424	704,400
VERIFICATION AND CONTROL TECHNOLOGY..........................	94,301	101,700
NUCLEAR SAFEGUARDS AND SECURITY...........................	57,053	66,900
SECURITY INVESTIGATIONS..............	32,200	33,300
NAVAL REACTORS DEVELOPMENT...........	535,693	593,600
SUBTOTAL, ATOMIC ENERGY DEFENSE ACTIVITIES.......................	7,216,640	8,230,000
USE OF PRIOR YEAR BALANCES AND OTHER ADJUSTMENTS	15,024	---
TOTAL, ATOMIC ENERGY DEFENSE ACTIVITIES - B/A....................	7,231,664	8,230,000

DEPARTMENT OF ENERGY
FY 1987 BUDGET
(BUDGET AUTHORITY IN THOUSANDS OF DOLLARS)

PROGRAMS FUNDED BY ENERGY AND
WATER DEVELOPMENT APPROPRIATIONS

DEPARTMENTAL ADMINISTRATION

	FY 1986 ESTIMATE	FY 1987 REQUEST
OFFICE OF THE SECRETARY..............	1,603	1,860
BOARD OF CONTRACT APPEALS............	384	356
GENERAL COUNSEL......................	9,715	9,953
INSPECTOR GENERAL....................	18,158	21,092
MANAGEMENT AND ADMINISTRATION........	121,540	140,147
OPERATIONS OFFICES...................	88,848	94,222
MINORITY ECONOMIC IMPACT.............	2,596	1,789
POLICY ANALYSIS AND SYSTEM STUDIES...	7,448	7,855
CONGRESSIONAL, INTERGOVERNMENTAL AND PUBLIC AFFAIRS	5,116	4,915
INTERNATIONAL AFFAIRS................	3,939	5,790
POLICY AND MANAGEMENT - (IA)	708	---
COST OF WORK FOR OTHERS..............	143,543	115,050
MISCELLANEOUS REVENUES...............	-161,743	-143,428
REVENUES NOT ASSOCIATED WITH COST OF WORK................................	-82,485	-108,519
SUBTOTAL, REVENUES	-244,228	-251,947
SUBTOTAL, DEPARTMENTAL ADMINISTRATION	159,370	151,082
USE OF PRIOR YEAR BALANCES AND OTHER ADJUSTMENTS	-9,051	---
TOTAL, DEPARTMENTAL ADMINISTRATION - B/A................................	150,319	151,082

DEPARTMENT OF ENERGY
FY 1987 BUDGET
(BUDGET AUTHORITY IN THOUSANDS OF DOLLARS)

PROGRAMS FUNDED BY ENERGY AND WATER DEVELOPMENT APPROPRIATIONS

POWER MARKETING ADMINISTRATIONS

	FY 1986 ESTIMATE	FY 1987 REQUEST
ALASKA POWER ADMINISTRATION OPERATIONS & MAINTENANCE...........	3,245	3,281
BONNEVILLE POWER ADMINISTRATION......	330,000	276,100
SOUTHEASTERN POWER ADMINISTRATION OPERATIONS & MAINTENANCE...........	14,735	21,736
SOUTHWESTERN POWER ADMINISTRATION OPERATIONS & MAINTENANCE...........	37,954	38,580
WESTERN AREA POWER ADMINISTRATION OPERATIONS & MAINTENANCE...........	196,842	283,775
SUBTOTAL, POWER MARKETING ADMINISTRATIONS..................	582,776	623,472
USE OF PRIOR YEAR BALANCES AND OTHER ADJUSTMENTS..................	-24,430	-59,198
TOTAL, POWER MARKETING ADMINISTRATIONS - B/A..............	558,346	564,274

FEDERAL ENERGY REGULATORY COMMISSION

	FY 1986 ESTIMATE	FY 1987 REQUEST
OIL PIPELINE REGULATION	3,624	4,486
NATURAL GAS REGULATION...............	44,297	45,031
HYDROPOWER LICENSING.................	26,820	29,343
ELECTRIC POWER REGULATION............	19,976	20,219
SUBTOTAL, FEDERAL ENERGY REGULATORY COMMISSION.......................	94,717	99,079
USE OF PRIOR YEAR BALANCES AND OTHER ADJUSTMENTS	-3,258	---
REVENUES............................	-49,470	-78,754
TOTAL, FEDERAL ENERGY REGULATORY COMMISSION - B/A..................	41,989	20,325

DEPARTMENT OF ENERGY
FY 1987 BUDGET
(BUDGET AUTHORITY IN THOUSANDS OF DOLLARS)

PROGRAMS FUNDED BY ENERGY AND WATER DEVELOPMENT APPROPRIATIONS

NUCLEAR WASTE FUND

	FY 1986 ESTIMATE	FY 1987 REQUEST
NUCLEAR WASTE FUND-B/A...............	499,037	769,349

GEOTHERMAL RESOURCES DEVELOPMENT FUND

	FY 1986 ESTIMATE	FY 1987 REQUEST
GEOTHERMAL RESOURCES DEVELOPMENT FUND - B/A.........................	69	72

DEPARTMENT OF ENERGY
FY 1987 BUDGET
(BUDGET AUTHORITY IN THOUSANDS OF DOLLARS)

PROGRAMS FUNDED BY INTERIOR AND
RELATED AGENCIES APPROPRIATIONS

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

	FY 1986 ESTIMATE	FY 1987 REQUEST
COAL		
CONTROL TECHNOLOGY & COAL PREPARATION..........................	31,950	18,147
ADVANCED RESEARCH & TECHNOLOGY DEVELOPMENT..........................	33,849	27,224
COAL LIQUEFACTION....................	31,620	9,147
COMBUSTION SYSTEMS..................	29,113	9,169
FUEL CELLS...........................	34,057	5,000
HEAT ENGINES.........................	12,314	7,942
UNDERGROUND COAL GASIFICATION........	4,072	---
MAGNETOHYDRODYNAMICS.................	27,717	---
SURFACE COAL GASIFICATION............	41,323	5,598
SUBTOTAL, COAL......................	246,015	82,227
GAS		
UNCONVENTIONAL GAS RECOVERY..........	8,503	5,252
PETROLEUM		
ADVANCED PROCESS TECHNOLOGY..........	5,523	1,811
ENHANCED OIL RECOVERY................	11,454	4,484
OIL SHALE............................	12,136	3,595
SUBTOTAL, PETROLEUM................	29,113	9,890
POLICY AND MANAGEMENT		
HEADQUARTERS PROGRAM DIRECTION......	13,380	11,260
ETC PROGRAM DIRECTION................	39,265	28,740
FED. INSP. - ALASKA GAS PIPELINE....	511	221
CAPITAL EQUIPMENT....................	2,865	---
CONSTRUCTION.........................	3,332	---
SUBTOTAL, POLICY AND MANAGEMENT...	59,353	40,221
COOPERATIVE VENTURE R&D POOLS	---	12,500
SUBTOTAL, FOSSIL ENERGY..............	342,984	150,090
USE OF PRIOR YEAR BALANCES AND OTHER ADJUSTMENTS..........................	-31,030	-67,323
TOTAL, FOSSIL ENERGY - B/A...........	311,954	82,767

DEPARTMENT OF ENERGY
FY 1987 BUDGET
(BUDGET AUTHORITY IN THOUSANDS OF DOLLARS)

PROGRAMS FUNDED BY INTERIOR AND
RELATED AGENCIES APPROPRIATIONS

NAVAL PETROLEUM AND OIL SHALE RESERVES

	FY 1986 ESTIMATE	FY 1987 REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES..........................	168,850	163,569
USE OF PRIOR YEAR BALANCES AND OTHER ADJUSTMENTS..........................	-155,848	-36,461
TOTAL, NAVAL PETROLEUM AND OIL SHALE RESERVES - B/A...............	13,002	127,108

ENERGY CONSERVATION

	FY 1986 ESTIMATE	FY 1987 REQUEST
CONSERVATION R&D:		
TRANSPORTATION.......................	56,637	19,800
INDUSTRIAL...........................	40,096	15,623
BUILDINGS AND COMMUNITY SYSTEMS......	37,280	14,150
MULTI-SECTOR.........................	25,574	19,850
FACILITIES...........................	9,608	---
POLICY AND MANAGEMENT................	1,687	1,792
SUBTOTAL, CONSERVATION R&D.........	170,882	71,215
STATE AND LOCAL......................	256,630	5,000
SUBTOTAL, ENERGY CONSERVATION......	427,512	76,215
USE OF PRIOR YEAR BALANCES AND OTHER ADJUSTMENTS........................	---	-36,782
TOTAL, ENERGY CONSERVATION - B/A.....	427,512	39,433

DEPARTMENT OF ENERGY
FY 1987 BUDGET
(BUDGET AUTHORITY IN THOUSANDS OF DOLLARS)

PROGRAMS FUNDED BY INTERIOR AND RELATED AGENCIES APPROPRIATIONS

ECONOMIC REGULATION

	FY 1986 ESTIMATE	FY 1987 REQUEST
FUELS CONVERSION......................	1,142	---
COMPLIANCE...........................	14,281	13,685
PETROLEUM OPERATIONS.................	2,079	2,060
PROGRAM ADMINISTRATION...............	646	1,105
OFFICE OF HEARINGS AND APPEALS.......	5,275	5,000
TOTAL, ECONOMIC REGULATION - B/A	23,423	21,850

EMERGENCY PREPAREDNESS

EMERGENCY PREPAREDNESS...............	5,750	6,044
TOTAL, EMERGENCY PREPARDENESS - B/A..	5,750	6,044

STRATEGIC PETROLEUM RESERVE

STRATEGIC PETROLEUM RESERVE..........	378,217	149,944
USE OF PRIOR YEAR BALANCES AND OTHER ADJUSTMENTS..................	-270,684	-149,944
TOTAL, STRATEGIC PETROLEUM RESERVE - B/A	107,533	---

DEPARTMENT OF ENERGY
FY 1987 BUDGET
(BUDGET AUTHORITY IN THOUSANDS OF DOLLARS)

PROGRAMS FUNDED BY INTERIOR AND RELATED AGENCIES APPROPRIATIONS

ENERGY INFORMATION ADMINISTRATION

	FY 1986 ESTIMATE	FY 1987 REQUEST
NATIONAL ENERGY INFORMATION SYSTEM:		
OIL AND GAS	12,267	12,379
COAL, NUCLEAR, ELECTRIC AND ALTERNATE FUELS	3,912	3,989
ENERGY MARKETS AND END USE..........	4,362	3,670
AUTOMATED DATA PROCESSING SERVICES STAFF	9,336	8,527
ENERGY INFORMATION CENTER	733	604
STATISTICAL STANDARDS	879	855
PROGRAM DIRECTION	18,512	19,104
SUBTOTAL, NATIONAL ENERGY INFORMATION SYSTEM	50,001	49,128
POLICY AND MANAGEMENT	7,723	10,523
TOTAL, ENERGY INFORMATION ADMINISTRATION - BA	57,724	59,651

PAYMENTS TO STATES

PAYMENT TO STATES	570	570

TOTAL DEPARTMENT OF ENERGY

SUBTOTAL............................	11,971,630	12,100,087
PROPOSED LEGISLATION:		
PRIVATIZATION OF NPR	---	-78,785
TOTAL	11,971,630	12,021,302

DOE/MA-0084/4
Volume 1 of 7

Congressional Budget Request

Atomic Energy Defense Activities

Volume 1

FY 1987

U.S. Department of Energy
Assistant Secretary,
Management and Administration
Office of the Controller
Washington, D.C. 20585

February 1986

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

ATOMIC ENERGY DEFENSE ACTIVITIES

VOLUME 1

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DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1985 Actual BA	FY 1986 Estimate BA	FY 1987 Request BA
Appropriations Before The Energy and Water Development Subcommittees:			
Energy Supply Research and Development	1,967,490	1,696,298	1,254,162
Uranium Enrichment	237,956	190,512	---
General Science and Research	724,860	655,928	773,400
Atomic Energy Defense Activities ..	7,322,321	7,231,664	8,230,000
Departmental Administration	128,602	150,319	151,082
Alaska Power Administration	3,233	3,245	2,881
Bonneville Power Administration ...	284,771	330,000	276,100
Southeastern Power Administration .	35,744	---	19,647
Southwestern Power Administration .	31,208	29,191	25,337
Western Area Power Administration .	218,230	195,910	240,309
Western Area Power Emergency Fund .	---	---	---
Federal Energy Regulatory Commission	54,543	41,989	20,325
Nuclear Waste Fund	327,669	499,037	769,349
Geothermal Resources Development Fund	121	69	72
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	$11,336,748	$11,024,162	$11,762,664

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1985 Actual BA	FY 1986 Estimate BA	FY 1987 Request BA
Appropriations Before Interior and Related Agencies Subcommittees:			
Alternative Fuels Production	$ 1,169,895	$ ---	$ ---
Clean Coal Technology	---	---	---
Fossil Energy Research and Development	289,048	311,954	82,767
Naval Petroleum and Oil Shale Reserves	156,874	13,002	127,108
Energy Conservation	457,436	427,512	39,433
Energy Regulation	27,139	23,423	21,850
Emergency Preparedness	6,045	5,750	6,044
Strategic Petroleum Reserve	2,049,550	107,533	---
Energy Information Activities	60,919	57,724	59,651
Subtotal, Interior and Related Agencies Subcommittees	4,216,906	946,898	336,853
Subtotal, Energy and Water Development Subcommittees	11,336,748	11,024,162	11,762,664
Subtotal, Department of Energy	15,553,654	11,971,060	12,099,517
Permanent - Indefinite Appropriations:			
Payments to States	1,052	570	570
Total, Department of Energy	$15,554,706	$11,971,630	$12,100,087

DEPARTMENT OF ENERGY
F Y 1987 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
ENERGY & WATER SUBCOMMITTEE				
HEADQUARTERS	4,865	4,965	-18	4,947
FIELD	9,133	9,185	111	9,296
SUBCOMMITTEE TOTAL	13,998	14,150	93	14,243
INTERIOR SUBCOMMITTEE				
HEADQUARTERS	1,353	1,304	-166	1,138
FIELD	907	896	-226	670
SUBCOMMITTEE TOTAL	2,260	2,200	-392	1,808
GRAND TOTAL	16,258	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,258	16,218	-497	15,721

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
10:ENERGY SUPPLY RESEARCH AND DEV	937	934	-34	900
HEADQUARTERS	811	820	-28	792
FIELD	126	114	-6	108
15:URANIUM ENRICHMENT	69	66	1	67
HEADQUARTERS	58	55	1	56
FIELD	11	11	0	11
20:GENERAL SCIENCE AND RESEARCH	37	39	0	39
HEADQUARTERS	37	39	0	39
25:ATOMIC ENERGY DEFENSE ACTIVITI	2,618	2,702	131	2,833
HEADQUARTERS	496	518	9	527
FIELD	2,122	2,184	122	2,306
30:DEPARTMENTAL ADMINISTRATION	3,307	3,332	-5	3,327
HEADQUARTERS	1,721	1,726	0	1,726
FIELD	1,586	1,606	-5	1,601
34:ALASKA POWER ADMINISTRATION	37	38	0	38
FIELD	37	38	0	38
36:BONNEVILLE POWER ADMIN	3,510	3,480	0	3,480
FIELD	3,510	3,480	0	3,480
38:SOUTHEASTERN POWER ADMIN	38	40	0	40
FIELD	38	40	0	40
42:SOUTHWESTERN POWER ADMIN	186	186	0	186
FIELD	186	186	0	186
46:WESTERN AREA POWER ADMIN	1,181	1,160	0	1,160
FIELD	1,181	1,160	0	1,160
50:WAPA - COLORADO RIVER BASIN	219	219	0	219
FIELD	219	219	0	219
52:FEDERAL ENERGY REGULATORY COMM	1,617	1,659	0	1,659
HEADQUARTERS	1,617	1,659	0	1,659
54:NUCLEAR WASTE FUND	238	292	0	292
HEADQUARTERS	123	147	0	147
FIELD	115	145	0	145
56:GEOTHERMAL RESOURCES DEV FUND	2	1	0	1
HEADQUARTERS	2	1	0	1
65:FOSSIL ENERGY RESEARCH AND DEV	714	700	-161	539
HEADQUARTERS	151	135	-26	109
FIELD	563	565	-135	430
70:NAVAL PETROL & OIL SHALE RES	104	104	-9	95
HEADQUARTERS	23	23	0	23
FIELD	81	81	-9	72
75:ENERGY CONSERVATION	333	352	-134	218
HEADQUARTERS	208	227	-79	148
FIELD	125	125	-55	70
80:EMERGENCY PREPAREDNESS	74	71	0	71
HEADQUARTERS	74	71	0	71
81:ECONOMIC REGULATION	377	340	-50	290
HEADQUARTERS	377	340	-50	290
85:STRATEGIC PETROLEUM RESERVE	178	152	-32	120
HEADQUARTERS	40	27	-5	22
FIELD	138	125	-27	98
90:ENERGY INFORMATION ACTIVITIES	480	481	-6	475
HEADQUARTERS	480	481	-6	475
94:ADVANCES FOR CO-OP WORK	2	2	0	2
FIELD	2	2	0	2
GRAND TOTAL	16,250	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,250	16,218	-497	15,721

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Atomic Energy Defense Activities

For expenses of the Department of Energy activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for atomic energy defense activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed [435] 344 of which [274] 320 are for replacement only) including [57] 36 police-type vehicles; and purchase of [three] five aircraft, [one] three of which [is] are for replacement only, [$7,604,615,000] $8,230,000,000, to remain available until expended. (Public Law 99-141, making appropriations for energy and water development, 1986.)

Explanation of Change

The Department's request for additional and replacement motor vehicles (24 and 320 respectively) in FY 1987 is significantly less than in FY 1986, a year which saw increased safeguards, security and waste management needs, but reflects a more typical annual procurement request.

The Department is also requesting purchase of five additional aircraft in FY 1987. One rotary wing aircraft will be used to replace a similar craft destroyed in an accident. Four fixed wing aircraft, two new and two that are intended to replace aging fixed wing aircraft, are also being requested for FY 1987.

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

ATOMIC ENERGY DEFENSE ACTIVITIES

(Budget Authority in thousands of Dollars)

	FY 1985 Actual	FY 1986 Estimate	FY 1987 Request
Research, Development and Testing	$ 1,790,037	$ 1,705,899	$ 2,077,400
Inertial Confinement Fusion	25,097	23,868	23,800
Production and Surveillance	2,311,671	2,285,953	2,502,204
Program Direction - Weapons	57,534	95,100	60,550
Verification and Control Technology .	76,637	94,301	101,700
Materials Production	1,745,335	1,768,149	2,066,146
Defense Waste and By-Products Management	727,746	618,424	704,400
Nuclear Safeguards and Security	60,014	57,053	66,900
Security Investigations	34,000	32,200	33,300
Naval Reactors Development	495,300	535,693	593,600
Subtotal, Atomic Energy	7,323,371	7,216,640	8,230,000
Addback of G-R-H Reduction Against Balances	---	7,157	---
Less Use of Prior Year Balances and Other Adjustments	---	7,867	---
Unobligated Balances Brought Forward	---	---	---
Savings from FY 84 Initiatives	-1,050	---	---
Total, Atomic Energy Defense Activities	$7,322,321	$7,231,664	$8,230,000

FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW
Atomic Energy Defense Activities

The Department's Atomic Energy Defense Activities include eight programs. The goal of these programs is to accomplish research and development, testing, production and lifetime surveillance of safe and reliable nuclear weapons to meet national defense needs, and develop naval nuclear propulsion. The eight programs are summarized below.

Weapons Activities

This program provides for the research, development, engineering, testing, and production of all U.S. nuclear weapons; maintenance of reliable weapons for their stockpile life; retirement and disposal of nuclear weapons from the stockpile; and the program support function that includes community assistance payments and salaries and related expenses of federal employees who manage and administer program activities. In FY 1987, the weapons program will continue to provide new technology to maintain a modern nuclear force, along with the design and development of new weapon systems in response to defense requirements. Increases are provided for continued production of weapon systems.

In FY 1987, the research, development, and testing effort will continue to explore and provide technologies necessary to maintain the U.S. nuclear forces and design and develop new weapon systems in response to defense requirements. Major objectives in the research, development, and testing area include maintaining the capability to design, test, and certify new weapons required for national defense; a concentration of inertial confinement fusion activities for weapons applications; advancing the state-of-the-art of nuclear weapons technology to assure that the U.S. is in the forefront of all technological initiatives, and monitoring the nuclear weapons stockpile to assure continued reliability and effectiveness. Efforts to explore new concepts will be accelerated within the nuclear weapons technology base and the effort to revitalize the weapons laboratory and test complex facilities will be continued.

The major objectives of the production and surveillance program are to continue to: produce and deliver new warheads, projectiles, and bombs for the U.S. nuclear weapons stockpile; provide and maintain modern manufacturing capabilities and capacities required for future production of weapons for enhancement of U.S. nuclear forces; and to maintain the U.S. nuclear weapons stockpile in a high state of readiness and reliability.

Verification and Control Technology

The goal of this program is to conduct the research, development, test, and support activities related to the detection of nuclear test activities in response to treaty verification and national security requirements; to provide the Department's expertise to significant nuclear intelligence, export control and arms control issues: and to review export license applications as required by the Atomic Energy Act as amended, the Nuclear Nonproliferation Act of 1978, and the Export Administration Act of 1979. The FY 1987 budget request emphasizes the fabrication, demonstration, and deployment of both research and operational verification systems.

Materials Production

The materials production program provides nuclear materials to meet near-term requirements for national defense, Departmental research and development programs, other government agencies, industry, and for processing of naval reactor spent fuels. The FY 1987 budget will allow the Department to continue to operate necessary production, processing, and support facilities and continue to sustain a base production program capable of meeting long-term nuclear materials production requirements consistent with the annual Nuclear Weapons Stockpile Memorandum approved by the President and the annual Department of Energy Materials Management Plan. Efforts will continue to ensure that the production facilities will be operated in a safe, secure, and environmentally acceptable manner.

Defense Waste and Byproducts Management

The defense waste and byproducts management program provides for the safe interim storage or utilization of nuclear wastes and byproducts generated primarily from nuclear materials production and naval propulsion while continuing the development of technologies and facilities for the final disposal of defense nuclear waste. The primary program elements: interim waste operations, long-term waste management technology, and terminal storage provide mainly for the handling and disposal of low-level and airborne radioactive waste, the storage of transuranic and high-level waste, development of technology for the long-term management of radioactive waste, and the demonstration of the safe disposal of defense waste. The FY 1987 request will enable the program to continue toward its goal to safely dispose of defense nuclear waste.

Nuclear Safeguards and Security

This program is responsible for developing measures to assure adequate protection of the Department of Energy's nuclear weapons, nuclear materials, facilities, and classified information against theft and sabotage. The program also provides safeguards-related technical support to U.S. and international activities designed to minimize the proliferation of nuclear weapons. The FY 1987 budget request will permit continuation of these vital program activities.

Security Investigations

The objective of the security investigations program is to ensure that the common defense and security of the U.S. is protected by an adequate background investigation and screening of those Department of Energy and Department contractor personnel who would, in the performance of their work, need access to Restricted Data, National Security Information or Special Nuclear Material, or who would occupy a designated Critical Sensitive position. Approximately 30,764 security investigations will be conducted in FY 1987.

Naval Reactors

The Naval Reactors Development program carries out nuclear propulsion development work essential to the U.S. Navy. Nuclear propulsion provides the Navy with ships having virtually unlimited high speed endurance, and allows ships to be designed with greatly increased capability for sustained combat operations. The program provides for the design, development, testing, and evaluation of improved naval nuclear propulsion plants and reactor cores having higher reliability, improved performance, and simplified operating and maintenance requirements. The nuclear propulsion plants and cores cover a wide range of configurations and power ratings suitable for installation in naval combatants varying in size from small submarines to large surface ships. In FY 1987, ongoing research, development, and test efforts will continue, including design and development of an Advanced Fleet Reactor which will provide enhanced performance for a new generation of nuclear power attack submarines.

DEPARTMENT OF ENERGY
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES

VOLUME 1

Weapons Activities

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DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
WEAPONS ACTIVITIES
Atomic Energy Defense Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs. Base
Weapons Activities (DP)					
Research, Development, and Testing					
Operating Expenses	$1,461,337 a/	$1,413,609 i/	$1,413,609	$1,701,000	$287,391
Capital Equipment	132,150 b/	135,229 j/	135,229	189,570	54,341
Construction	196,550 c/	157,061 k/	157,061	186,830	29,769
Subtotal	$1,790,037	$1,705,889	$1,705,899	$2,077,400	$371,501
Inertial Fusion					
Operating Expenses	$ 23,797 d/	$ 22,568 l/	$ 22,568	$ 22,500	$ -68
Capital Equipment	1,300 e/	1,300 m/	1,300	1,300	0
Construction	0	0	0	0	0
Subtotal	$ 25,097	$ 23,868	$ 23,868	$ 23,800	$ -68
Production and Surveillance					
Operating Expenses	$1,806,282 f/	$1,739,789 n/	$1,739,789	$1,968,504	$228,715
Capital Equipment	119,400	125,300	125,300	132,000	6,700
Construction	385,989 g/	420,864 o/	420,864	401,700	-19,164
Subtotal	$2,311,671	$2,285,953	$2,285,953	$2,502,204	$216,251
Program Direction					
Operating Expenses	$ 57,534 h/	$ 95,100 p/	$ 95,100	$ 60,550	$-34,550
Subtotal	$ 57,534	$ 95,100	$ 95,100	$ 60,550	$-34,550
Total					
Operating Expenses	$3,348,950	$3,271,066	$3,271,066	$3,752,554	$481,488
Capital Equipment	252,850	261,829	261,829	322,870	61,041
Construction	582,539	577,925	577,925	588,530	10,605
Subtotal	$4,184,339	$4,110,820	$4,110,820	$4,663,954	$553,134
Staffing - Total FTE's					
Research, Development, and Testing	233	250	250	252	2
Production and Surveillance	654	671	671	777	106
Program Direction	799	826	826	838	12
Total	1,686	1,747	1,747	1,867	120

Authorization: Section 1, Public Law 83-703
Section 91, Atomic Energy Community Act of 1955

FY 1986 Adjusted Appropriation reflects $216,725,000 sequestered to comply with the Balanced Budget and Energy Deficit Control Act of 1985 (Public Law 99-177).

NOTE: Explanation of footnotes on following pages.

Footnotes for the FY 1987 Congressional Lead Table

a/ FY 1985 appropriation - $1,337,625,000. Reflects Automatic Data Processing general reduction of $5,212,000. Reflects Deficit Reduction Act of 1984, Public Law 98-369, reduction of $1,240,000. Reflects reprogramming of $2,750,000 to Project 85-D-102. Reflects comparability adjustment of $3,100,000 for the Los Alamos Meson Physics Facility transferred to the Energy Supply Research and Development appropriation. Reflects comparability adjustment of $5,061,000/100 FTE's transferred from Weapons Program Direction. Reflects comparability adjustment of $130,953,000 transferred from the Inertial Fusion Program.

b/ FY 1985 appropriation - $122,450,000. Reflects comparability adjustment of $9,700,000 transferred from the Inertial Fusion Program.

c/ FY 1985 appropriation - $190,300,000. Reflects reprogramming of $2,750,000 from Weapons Research, Development, and Testing operating for Project 85-D-102. Reflects comparability adjustment of $3,500,000 transferred from the Inertial Fusion Program.

d/ FY 1985 appropriation - $154,750,000. Reflects comparability adjustment of $130,953,000 transferred to Weapons Research, Development, and Testing.

e/ FY 1985 appropriation - $11,000,000. Reflects comparability adjustment of $9,700,000 transferred to Weapons Research, Development, and Testing.

f/ FY 1985 appropriation - $1,810,900,000. Reflects Automatic Data Processing reduction of $1,813,000 and $2,805,000 Deficit Reduction Act of 1984, Public Law 98-369.

g/ FY 1985 appropriation - $398,150,000. Reflects Management Initiatives reduction of $12,161,000.

h/ FY 1985 appropriation - $60,855,000. Reflects Management Initiatives reduction of $1,239,000. Reflects comparability adjustment of $5,061,000/100 FTE's transferred to Weapons Research, Development, and Testing. Reflects comparability adjustment of $2,979,000/17 FTE's transferred to the Office of the Assistant Secretary for Defense Programs as a result of a reorganization.

i/ FY 1986 appropriation - $1,371,800,000. Reflects $84,386,000 sequestered to comply with the Balanced Budget and Energy Deficit Control Act of 1985 (Public Law 99-177). Reflects comparability adjustment of $120,900,000 transferred from the Inertial Fusion Program. Reflects comparability adjustment of $5,295,000/100 FTE's transferred from Weapons Program Direction.

j/ FY 1986 appropriation - $131,450,000. Reflects $4,921,000 sequestered to comply with the Balanced Budget and Energy Deficit Control Act of 1985 (Public Law 99-177). Reflects comparability adjustment of $8,700,000 transferred from the Inertial Fusion Program.

k/ FY 1986 appropriation - $168,600,000. Reflects $2,875,000 sequestered to comply with the Balanced Budget and Energy Deficit Control Act of 1985 (Public Law 99-177). Reflects $8,500,000 general reduction. Reflects $164,000 Management Initiatives reduction.

l/ FY 1986 appropriation - $145,000,000. Reflects $1,532,000 sequestered to comply with the Balanced Budget and Energy Deficit Control Act of 1985 (Public Law 99-177). Reflects comparability adjustment of $120,900,000 transferred to Weapons Research, Development, and Testing.

m/ FY 1986 appropriation - $10,000,000. Reflects comparability adjustment of $8,700,000 transferred to Weapons Research, Development, and Testing.

n/ FY 1986 appropriation - $1,858,000,000. Reflects $104,561,000 sequestered to comply with the Balanced Budget and Energy Deficit Control Act of 1985 (Public Law 99-177). Reflects $6,700,000 Management Initiatives reduction. Reflects reprogramming of $1,900,000 to Program Direction. Reflects proposed appropriation transfer reduction of $3,800,000 for environmental assessment activities to the Energy Supply Research and Development appropriation. Reflects proposed appropriation transfer of $1,250,000 to the Departmental Administration appropriation for an FTE general clerical reduction.

o/ FY 1986 appropriation - $450,050,000. Reflects $18,450,000 sequestered to comply with the Balanced Budget and Energy Deficit Control Act of 1985 (Public Law 99-177). Reflects $3,600,000 general reduction and $7,136,000 Management Initiatives reduction.

p/ FY 1986 appropriation - $98,700,000. Reflects reprogramming of $1,900,000 from Weapons Production and Surveillance. Reflects comparability adjustment of $120,000/5 FTE's transferred to the Office of the Assistant Secretary for Defense Programs. Reflects proposed appropriation transfer reduction of $325,000/6 FTE's for environmental assessment activities to the Energy Supply Research and Development appropriation. Reflects comparability adjustment of $5,295,000/100 FTE's to Weapons Research, Development, and Testing. Includes $41,133,000 for termination of the Oak Ridge portion of the Community Assistance Program.

Department of Energy
FY 1987 Congressional Budget Request
Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	General Reduction	Management Initiatives	Pay Cost Restoration	FTE General Reduction	Gramm-Rudman-Hollings	ES&H /Transfer/ Reprogramming	Subtotal	Comparability Adjustments	Adjusted Approp. Total
Weapons Activities (DP)										
Research, Development, and Testing										
Operating Expenses	$1,371,800	$ -	$ -	$ -	$ -	$ -78,813	$ -	$1,292,987	$ +120,622	$1,413,609
Capital Equipment	131,450	-	-	-	-	-4,431	-	127,019	+8,210	135,229
Construction	168,600	-8,500	-164	-	-	-2,875	-	157,061	-	157,061
Subtotal	1,671,850	-8,500	-164	-	-	-86,119	-	1,577,067	+128,832	1,705,899
Inertial Confinement Fusion										
Operating Expenses	145,000	-	-	-	-	-7,105	-	137,895	-115,327	22,568
Capital Equipment	10,000	-	-	-	-	-490	-	9,510	-8,210	1,300
Construction	-	-	-	-	-	-	-	-	-	-
Subtotal	155,000	-	-	-	-	-7,595	-	147,405	-123,537	23,868
Production & Surveillance										
Operating Expenses	1,858,000	-	-6,700	-1,900[a]	-1,250	-104,561	-3,800	1,739,789	-	1,739,789
Capital Equipment	125,300	-	-	-	-	-	-	125,300	-	125,300
Construction	450,050	-3,600	-7,136	-	-	-18,450	-	420,864	-	420,864
Subtotal	2,433,350	-3,600	-13,836	-1,900	-1,250	-123,011	-3,800	2,285,953	-	2,285,953
Program Direction	98,700	-	-	+1,900[a]	-	-	-	100,600	-5,500	95,100
Subtotal, Weapons Activities	4,358,900	-12,100	-14,000	-	-1,250	-216,725	-3,800	4,111,025	-205	4,110,820
General Reduction	-12,100	+12,100	-	-	-	-	-	-	-	-
Management Initiatives:										
Operating Expenses	-6,700	-	+6,700	-	-	-	-	-	-	-
Capital Equipment	-	-	-	-	-	-	-	-	-	-
Construction	-7,300	-	+7,300	-	-	-	-	-	-	-
Total, Management Initiatives	-14,000	-	+14,000	-	-	-	-	-	-	-
FTE Reduction	-1,250	-	-	-	+1,250	-	-	-	-	-
Total, Weapons Activities ...	$4,331,550	$ -	$ -	$ -	$ -	$-216,725	$ -3,800	$4,111,025	$ -205	$4,110,820
Operating Expenses	3,465,550	-	-	-	-	-190,479	-3,800	3,271,271	-205	3,271,066
Capital Equipment	266,750	-	-	-	-	-4,921	-	261,829	-	261,829
Construction	599,250	-	-	-	-	-21,325	-	577,925	-	577,925

[a] Proposed reprogramming to cover pay cost absorption.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
WEAPONS ACTIVITIES
(In thousands of dollars)

Weapons Research, Development, and Testing

FY 1986 Adjusted Appropriation/FY 1987 Base	$1,705,899
Program increases and decreases:	
Escalation for operating expenses, basic capital equipment, and general plant projects	+ 89,350
Increase activity in the SDI area of the research, development, and testing program to achieve established milestones	+ 206,391
Increase in basic capital equipment in support of SDI	+ 36,391
Increase in General Plant Projects to achieve minimum acceptable level of support for maintenance of physical plant	+ 100
Increase in automatic data processing purchases to support increased requirement from SDI	+ 11,000
Two new starts in construction - an environmental project and a safeguards project:	
- Environmental Compliance and Cleanup, LLNL	+ 7,000
- Safeguards and Security Enhancement, Phase II, LLNL	+ 4,300
Maintain planned funding profile for prior-year projects	+ 16,969
FY 1987 Budget Request	$2,077,400

Inertial Fusion

FY 1986 Adjusted Appropriation/FY 1987 Base	$ 23,868
Program increases and decreases:	
Escalation for operating expenses	+ 1,071
Decrease experimental support to national laboratories	- 1,139
FY 1987 Budget Request	$ 23,800

Weapons Production and Surveillance

FY 1986 Adjusted Appropriation/FY 1987 Base	$2,285,953
Program increases and decreases:	
Escalation for operating expenses	+ 79,345
Escalation for capital equipment and general plant projects	+ 7,810
Increase operating expenses to meet DOD delivery schedule projections	+ 149,370
Increased level of equipment replacements	+ 2,617
Decrease in Automatic Data Processing acquisitions	- 2,203
Increase in general plant projects for essential activities only	+ 1,776
Reduced level of equipment and utility restoration activities	- 35,350
Initiate project for Short Range Attack Missile II production facilities	+ 5,000
Initiate one new environmental, safety, and health (ES&H) project:	
- ES&H Upgrade, Mound Plant	+ 2,400
Initiate one new safeguards and security project:	
- Shipping and Receiving Facility, Pinellas Plant	+ 300
Initiate Protective Clothing Decontamination Facility, Rocky Flats	+ 500
Continue and complete prior-year construction activities	+ 4,686
FY 1987 Budget Request	$2,502,204

Weapons Program Direction

FY 1986 Adjusted Appropriation/FY 1987 Base	$ 95,100
Program increases and decreases:	
Personnel-related expenses including salaries, benefits, and travel for 12 additional full-time equivalents plus cost-of-living increases, Federal Medicare and FICA contributions, and increased health benefits	+ 2,403
Provides for increased costs of contractual services	+ 3,797
Increase in the Los Alamos Community Assistance Program based on contract formula adopted by the Department of Energy Working Group on Community Assistance	+ 383
Terminates the Oak Ridge portion of the Community Assistance Program	- 41,133
FY 1987 Budget Request	$ 60,550

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

The weapons program budget provides for essential effort required to support the research, development, testing, production, and lifetime surveillance of safe and reliable nuclear weapons to meet national defense needs. Research, development, and testing activities in FY 1987 will be pursued in support of weaponization requirements related to the W81 warhead for the Standard Missile-2, the W82 warhead for the Artillery Fired Atomic Projectile, the W87 warhead for the PEACEKEEPER system, the W88 TRIDENT II warhead, and the Antisubmarine Warfare/ Standoff Weapon. This budget is structured to continue to emphasize the technology base, especially areas related to the Strategic Defense Initiative, while still being responsive to the near-term needs for weaponization. The research and development employment in the weapons laboratories is planned to increase by about 800 full-time equivalents to support maintenance of an adequate technology base and in particular the strategic defense initiative.

The testing budget will support a balanced effort of nuclear device tests in FY 1987 and allow for the preparation required to support the testing effort in future years. Many of the proposed tests will be multipurpose and emphasis will be placed upon obtaining experimental information in the most cost-effective manner.

The Inertial Fusion research and development program previously conducted at the weapons laboratories will be integrated into the overall weapons research and development program, and therefore no longer funded as a separate program. The Inertial Fusion research and development conducted at the three non-Department of Energy laboratories will continue to be funded separately and will continue to focus primarily on the inertial fusion phenomenology as a non-weapon physics research endeavor.

The budget also provides for the production of new nuclear weapons for the stockpile and for the surveillance and maintenance of existing stockpile weapons as approved by the President. Included is the full-scale production of the B61-3 and -4 bombs, the W76 warhead for the TRIDENT, the W80-0 warhead for the Sea Launched Cruise Missile, the W80-1 warhead for the Air Launched Cruise Missile, the B83 Strategic Bomb, the W84 warhead for the Ground Launched Cruise Missile, and the W87 warhead for the PEACEKEEPER missile. Also included is the preproduction effort for the W81 warhead for the Standard Missile-2, the W82 warhead for the 155mm Artillery Fired Atomic Projectile, the W88 warhead for the TRIDENT II, and pre-Phase 3 systems including the Short Range Attack Missile II, Antisubmarine Warfare Weapon warheads, and the Small Intercontinental Ballistic Missile.

Reference is made throughout the budget to the weapons program phases that outline the functions and procedures which are followed in the "birth-to-death" cycle of a nuclear weapon. These phases were defined in a joint Atomic Energy Commission-Department of Defense agreement dated March 21, 1953. This agreement is still in effect and the only significant change to this portion of the original agreement has been the addition of Phase 7 and the division of Phase 2 into two distinct study efforts.

These phases are:

Phase 1 - Concept Definition
Phase 2 - Feasibility Study
Phase 2a - Design Definition and Cost Study
Phase 3 - Development Engineering or Full-Scale Development
Phase 4 - Production Engineering
Phase 5 - First Production
Phase 6 - Quantity Production and Stockpile
Phase 7 - Retirement

	FY 1986 Adjusted Appropriation	FY 1987 Request
Research, Development, and Testing	$1,705,899	$2,077,400
OPERATING EXPENSES	$1,413,609	$1,701,000
Research and Development	$ 912,251	$1,067,200
Testing	$ 501,358	$ 633,800

This program provides for the effort performed by the Lawrence Livermore National Laboratory, the Los Alamos National Laboratory, the Sandia National Laboratories, the Nevada Operations Office, and other contractors in research, development, and testing of nuclear weapons. This includes research, development, engineering, and certification of nuclear warheads required by the Department of Defense for stockpile, investigation of concepts and technologies for future weapons, and advancement of the sciences and technologies applicable to nuclear weapons as well as related activities in the strategic defense initiative. The inertial fusion activities at the weapons laboratories have been incorporated into the research, development, and testing program because of their contribution to the weapons technology base.

The research, development, and testing program is directed toward the generation of new ideas in weapon concepts and technologies and the application of these developments to continuing, new, or evolving Department of Defense requirements in a timely, efficient, and economical manner.

The goals of the research, development, and testing program are the development and application of nuclear weapons technology and nonnuclear scientific and engineering support to maintain and improve current nuclear weapons systems, and to develop new weapons for the United States nuclear weapons stockpile in accordance with identified national security requirements.

The major objectives to be accomplished to achieve the program goals are as follows:

- Maintain the capability to design, test, and certify new nuclear weapons required for national defense.
- Understand the basic technologies involved in nuclear weapon operation, manufacture, and maintenance and thereby provide enhanced efficiency and reliability.
- Explore feasible nuclear weapon concepts in order to know what designs are possible for us or for our adversaries.
- Understand nuclear weapon outputs, effects, and vulnerabilities.
- Monitor the nuclear weapons stockpile to assure continued reliability and effectiveness.
- Improve analytical and experimental capabilities to support the nuclear weapons development process.
- Investigate the feasibility of directed energy weapons to assess adversary threat in support of the President's Strategic Defense Initiative.
- Conduct inertial fusion research to improve understanding of weapon physics and develop laboratory-scale effects capability.

Laboratory research and development employment and the level of underground nuclear device tests are approximate indicators of the levels of effort being devoted to these activities. The following table summarizes and compares the FY 1986 level of effort and the programs that can be accommodated within the FY 1987 request.

	FY 1986		FY 1987	
	R&D Employment		R&D Employment	
	Direct	Total	Direct	Total
Weapons technology base	2,580	4,970	3,050	5,850
Weapons development, engineering, and certification	1,630	3,530	1,590	3,450
Testing capabilities	18	30	18	30
Special projects	272	500	282	520
Total	4,500	9,030	4,940	9,850

The request includes a Federal employment level of 252 full-time equivalents at the following offices:

Nevada Operations Office	102
Los Alamos Area Office Support Staff	142
San Francisco Operations Office Couriers	8
Total	252

Technology base activities provide the fundamental scientific and engineering data base and facility capabilities upon which this Nation's nuclear weapons research, development, engineering, and certification efforts are based. The primary emphasis in this area is on providing an inventory of proven ideas and concepts for timely and effective application to evolving Department of Defense system requirements; the conduct of basic studies in unique areas of physics, mathematics, chemistry, and the engineering sciences that will provide tomorrow's advances in nuclear weapons technology; and the maintenance of a central core of facilities and capabilities unique to nuclear weapon design. In FY 1987, approximately $880,000,000 will be devoted to technology base activities compared to $680,409,000 in FY 1986 to support achievement of strategic defense initiative milestones and to maintain required competence in nuclear bomb and warhead technology.

Efforts within the technology base category include:

1. Advanced concepts - Develops design concepts and components with potential for future Department of Defense systems applications. Emphasis will continue in areas where exploratory experimentation is expected to provide significant payoffs during the intermediate term. However, increased effort will be expended on investigations of concepts such as directed energy weapons activities having longer term payoffs as well.

2. Supporting research - Includes those program areas that are fundamental to nuclear weapon development. Included under supporting research are most of the disciplines associated with the physical, chemical, mathematical, and engineering sciences.

3. Supporting technologies - Includes those activities related to improved utilization of laboratory experimental facilities and capabilities; increased understanding of advanced materials and their potential applications; development of processes to formulate and fabricate new materials; and the development and application of computer codes to understand and interpret the physics of nuclear, laser, microwave, and particle beam devices and to analyze and predict the response of engineering materials and structures to various environments.

Technology base activities have traditionally supported nuclear bomb and warhead development, but in recent years nuclear-driven directed energy weapon research has become increasingly important as a factor in the search for a strategic defense capability.

Nuclear-Driven Directed Energy Weapons Research

This is a project to determine the feasibility of nuclear-driven directed energy weapons (NDEW). Nuclear research is included in the Strategic Defense Initiative (SDI) program for two reasons: (1) threat definition; and (2) defensive system options. Threat definition refers to understanding the Soviet's capability to design and deploy NDEW which would put the U.S. retaliatory force or a future defensive system at risk. These data are required as soon as possible because of the potential impact they could have on current nonnuclear SDI research and planning. Nuclear directed energy weapons are also being researched as U.S. SDI options because of their potentially unique capabilities and as a hedge against the failure of nonnuclear defensive weapons to meet performance requirements.

The Department of Energy is presently conducting research on five NDEW concepts: x-ray lasers, hypervelocity pellets, microwaves, particle beams, and optical lasers.

Research efforts for the next several years include basic theoretical physics, computer modeling and laboratory experimental validation, diagnostic instrumentation development, chemistry and materials research, dedicated underground nuclear experiments, engineering research on potential platform configurations, and systems analyses.

The inherent advantages of NDEW's are their relatively small size, low mass, and high power features. NDEW's essentially represent a new generation of precisely tailored effects from a nuclear explosives device. The NDEW concepts will require significant advances into new regimes of basic physics not previously explored at such depth, especially laser physics, plasma processes, and atomic physics. In addition, the most advanced supercomputers for experiment and weapon modeling, problem analysis, artificial intelligence, discrimination, and communications capabilities will be required. Also required are new levels of engineering precision heretofore unattained. The overall problem is very complex.

A basic concept of nearly all NDEW's involves the conversion of energy from a nuclear explosive device. Specifically, conversion of one or more forms of the prompt output of the explosion (x-rays, gamma rays, or neutrons) to some other form of energy and redirection of that energy. This may be a several step process with the final form of the directed energy being x-rays, hypervelocity projectiles, microwaves, optical frequency photons, or atomic particles (electrons and protons).

Although we have prioritized the NDEW research, at this time it would be premature to down-select among any of the NDEW concepts. As research proceeds, the various NDEW concepts will be continually reviewed relative to projected military utility and likelihood of scientific success in order to meet Strategic Defense Initiative Office technical feasibility decision milestones on competing concepts for the early 1990's.

Supporting Research for NDEW Concepts

Vulnerability, Lethality, and Countermeasures

The investigation of vulnerability, lethality, and countermeasures is included for all of the NDEW concepts. This research is vital because it evaluates the effectiveness of particular defensive weapon concepts. Countermeasures and countertactics will be studied in terms of hardening and shielding targets from attack, evading attack, and restricting attacks as well as evaluating NDEW concept effectiveness.

System Studies

System studies are conducted concurrently with NDEW concept research to focus on the operation and role of each concept as part of an integrated strategic defense system architecture. The viability of a given concept within a total system framework as well as the given concept's distinct merit will be a consideration in arriving at a technical feasibility decision to proceed with engineering development. System studies also encompass risk, stability, and threat assessments in potentially moving from a retaliatory deterrent posture to a defensive deterrent posture.

New and Innovative Concepts

Members of the scientific community, academia, and industry will be offered opportunities to identify new and innovative ideas on NDEW concepts and supporting research related to vulnerability, lethality, and countermeasures. The ideas generated may provide a catalyst for new approaches in the research conducted by the national laboratories.

During FY 1987, underground nuclear device tests will be conducted at the Nevada Test Site in support of technology base activities. These field tests are an integral element in confirming the feasibility and practicality of the ideas and concepts developed in the technology base category.

Weapons development, engineering, and certification activities are guided by current national requirements for providing new strategic nuclear weapon options, for modernizing tactical nuclear weapons, and for monitoring and maintaining the reliability of all nuclear weapons now in stockpile. All Phase 3 development engineering requests are transmitted formally by the Department of Defense to the Department of Energy through the Military Liaison Committee. Approximately $474,500,000 will be allocated to weapons development, engineering, and certification efforts in FY 1987 compared to $438,900,000 in FY 1986.

Weapons development, engineering, and certification activities for weapons systems that will be in at least Phase 3 in FY 1987 will include the following:

W81 Standard Missile-2 Warhead

The W81 nuclear warhead for the Navy's Standard Missile-2 will provide a defensive capability against nuclear-armed air, surface, and submarine launched cruise missile threats.

W82 155mm Artillery-Fired Atomic Projectile (AFAP) Warhead

The W82 warhead is being developed as a replacement for the obsolescent W48 as part of the Army's AFAP modernization program. This warhead will have better range, accuracy, and reliability than the W48.

W87 PEACEKEEPER Warhead

The W87 warhead is being designed to incorporate insensitive high explosive, improved fire resistance, and other enhanced safety features for application in the PEACEKEEPER system.

W88 TRIDENT II Warhead

The W88 warhead is being developed to provide a high yield capability for the Sea Launched Ballistic Missile force. The warhead/reentry body combination is a new design to provide enhanced kill capability.

Antisubmarine Warfare/Standoff Weapon (ASW/SOW)

The ASW/SOW will be a new depth bomb replacement for the current SUBROC/W55.

Antisubmarine Warfare Nuclear Depth/Strike Bomb (ASW ND/SB)

The ASW ND/SB will be a new air-dropped, dual purpose replacement for the B57 and some B61 Mods for the U.S. Navy.

Small Intercontinental Ballistic Missile (SICBM)

The SICBM will be a small single warhead ICBM in one or several basing modes with emphasis on mobility.

Other candidate systems will continue in or could enter Phase 1 concept definition study status, Phase 2 feasibility study status, or Phase 2A design definition and cost study status during FY 1987.

Weapons development, engineering, and certification effort also includes stockpile improvement, future weapons, and stockpile management. The stockpile improvement effort is intended to extend the stockpile life of existing weapons by incorporating technical improvements such as insensitive high explosives. These improvements are a cost-effective alternative to replacement of existing weapons. Future weapon efforts cover pre-Phase 1, Phase 1, Phase 2, and Phase 2A studies of nuclear weapon systems. Stockpile management includes a small research and development effort in support of production and monitoring of the stockpile.

Testing capabilities category encompasses those activities necessary to maintain and enhance capabilities for conducting nonnuclear laboratory scale and field experiments and for conducting full-scale underground nuclear device tests at the Nevada Test Site. Included in this category are efforts directed toward (1) improving the technology in all areas of testing that are relevant to the nuclear weapons program, (2) insuring that all nuclear device tests are executed in a safe and environmentally acceptable manner, (3) maintenance and operation of the Nevada Test Site, (4) provision of logistical support to the laboratories and other technical organizations that participate in test activities at the Nevada Test Site, and (5) preparatory activities for future testing at the Nevada Test Site. In FY 1987, program and funding requirements permitting, increased emphasis will continue to be placed upon improvements in such areas as containment technology; drilling, emplacement, and stemming techniques; prompt diagnostics incorporating digitized data and fiber optics; and radiochemistry diagnostic techniques and analysis. In FY 1987, approximately $275,600,000 will be devoted to testing capabilities compared to $233,700,000 in FY 1986.

Special projects category includes activities that utilize many of the scientific and technical capabilities employed in the design and development of nuclear weapons to support related needs. Major areas of emphasis include research and development efforts related to improved hardware, systems, and procedures for the protection of nuclear weapons and strategic quantities of special nuclear material during shipment and storage; the operational costs associated with maintenance of the Department of Energy's Nuclear Emergency Search Team (NEST) capabilities located at Las Vegas, Nevada, and Andrews Air Force Base, Maryland; and research efforts directed toward the development of improved search and detection systems and techniques and other special studies and audits. This category also contains the funding for federal employment and related services in support of the research, development, and testing effort. In FY 1987, approximately $66,500,000 is planned for special projects compared to $55,900,000 in FY 1986.

Marshall Islands Environmental Program category includes costs incurred in carrying out the Department's health and environmental obligations and responsibilities with respect to residual studies relating to the United States nuclear weapons atmospheric testing program, primarily in the Marshall Islands. The FY 1987 funding request assumes transition of the Marshall Islands effort from the United States Government to the Government of the Marshall Islands as called for under the Compact of Free Association. In FY 1987, approximately $4,400,000 is planned for this work compared to $4,700,000 appropriated in FY 1986.

Following is the list of automatic data processing leases planned for FY 1987.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Lawrence Livermore National Laboratory		
Cray X/MP 48	$ 6,865	$ 5,435
Class VI/VII	4,575	9,150
Class VII	0	5,015
Total, Lawrence Livermore National Laboratory	11,440	19,600
Los Alamos National Laboratory		
Cray 1, (3)	1,700	280
Cray X/MP (1)	2,300	2,300
Cray X/MP (2)	2,930	2,200
Cray X/MP (3)	3,510	760
Class VII	0	4,910
Total, Los Alamos National Laboratory	10,440	10,450
Sandia National Laboratories		
Laser printer, SNLA	140	140
Integrated file storage, SNLA	250	0
Administrative data processing centers, SNLA	500	0
Cray X/MP 24, SNLA	5,800	3,400
Network upgrade and storage completion, SNLL	370	370
Cray 1S, SNLL	1,900	0
Alphanumeric computer output microfilm, SNLA	150	0
Open timesharing expansion, SNLA	250	500
Interface buffer high performance graphics, SNLA	200	300
Class VI/VII, SNLA	0	5,600
Class VI/VII, SNLL	0	900
Total, Sandia National Laboratories	9,560	11,210
Total, ADP Leases	$31,440	$41,260

A discussion of new FY 1987 items follows.

	FY 1987 Request
Lawrence Livermore National Laboratory (LLNL)	
Class VII	$ 5,015
Los Alamos National Laboratory (LANL)	
Class VII	4,910

The use of high speed computers and mathematical models to simulate complex physical processes has been and continues to be the cornerstone of the weapons design. It is a key factor in maintaining the nuclear weapons technology base. Virtually all the major innovations in weapons design and physics understanding have been tied to advances in computational capability. To provide the best possible weaponry, we must have the best possible computational resources. Major new weapons design programs and a very rapid growth in strategic defense technology research will require us to sustain our rate of growth in computing capability and capacity. Class VII computers are consistent with growth plans, which involve the periodic selection of a computer that represents the state-of-the-art and provides a new level of capability, followed by additional acquisitions of similar machines to provide needed increments of capacity.

Requirements for the Class VII capabilities were established by the laboratories in FY 1985 and requests for Class VII's were included and approved in that year's budget. However, it appears that a new supercomputer that would be qualified to be designated a

Class VII machine will not be ready until FY 1987. Since this machine will probably be the first machine of a new class, the Class VII's will be leased in order that its performance and reliability can be proved before purchase.

	FY 1987 Request
Sandia National Laboratories (SNL)	
Class VI/VII (SNLA)	$ 5,600

The proposed Scientific Supercomputer will consist of four or more CPU's, 8 million or more words of memory and associated peripherals as needed to meet functional specifications. Weapon designs are becoming more complex as increased demands are placed on modern weapon systems. These demands require an increase in the quantity and quality of analysis for designs. Further research in these areas is vital to the development of new weapon concepts. Engineering, scientific, and systems applications in the laboratories demand additional high performance interactive capacity and capability to allow us to carry out our assigned mission more efficiently and in a manner which makes the most effective use of funds.

Class VI/VII (SNLL)	900

The present computational facilities are expected to be saturated, necessitating additional capacity if Sandia is to fulfill its mission. The installation of a new scientific computing system will not only increase computational capacity, but will also increase the capability to solve larger, more complex problems. The need for increased capability will come through efforts providing computer codes that more closely model the physical world including two- and three-dimensional problems.

No major items of ADP equipment are requested for lease in the testing program in FY 1987.

	FY 1986 Adjusted Appropriation	FY 1987 Request
CAPITAL EQUIPMENT	$ 135,229	$ 189,570
Research and Development	91,022	117,570
Testing	44,207	72,000

An adequate capital equipment base is crucial to maintaining the viability of the nuclear weapons complex. Physical and technological deterioration of equipment in the research, development, and testing facilities has been and continues to remain a serious concern. The need to repair past deterioration in basic equipment and the rising cost of technically advanced equipment in the areas of diagnostics and ADP argue for a substantial increase, even in the face of budgetary constraints. Evaluation of various directed energy concepts will require both laboratory and underground nuclear effects experiments with advanced diagnostics to record results.

Basic Equipment	$ 103,329	$ 146,670
Research and Development	60,372	74,670
Testing	42,957	72,000

Basic equipment funding continues to be a high priority at the laboratories and the Nevada Test Site. For FY 1987, the sites were asked to develop funding estimates for basic equipment which would halt further deterioration in the equipment base. Within these estimates, some basic equipment funding is requested for acquiring new, advanced capability. State-of-the-art diagnostic and experimental tools play a key role in the success of research and development efforts at the laboratories. Equipment acquired by the laboratories is unique and represents new capability--rather than redundancy or efficiency. Other basic equipment is requested to increase capacity at the same level of technology. This portion of the request contributes to the efficiency of the programs. The basic equipment request is also directed toward replacement of equipment which will wear out or become technically obsolete in FY 1987.

The majority of the increase in basic equipment will be used to support the Strategic Defense Initiative program in FY 1987. Overall, the increase will provide for the appropriate balance of equipment resources in conjunction with the operating program.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Automatic Data Processing (ADP)	$ 31,900	$ 42,900
Research and Development	30,650	42,900
Testing	1,250	0

Scientific computers are an essential tool for fulfilling the mission of the weapons design and engineering of the research, development, and testing program. Current weapon design and engineering problems have become increasingly complex and formulation of adequate solutions requires the most advanced computational resources in the world. To date, our laboratories have been in the forefront of computer science and the investment in computing hardware and software is substantial. Hardware includes the large computer mainframes, output devices, networks and communications; software is all of the operating systems, networking, communications, in addition to the models and algorithms which permit, in some cases, the only means to design and simulate many of our most advanced concepts. Modeling is cost effective when compared to the alternative of testing certain aspects at the Nevada Test Site. While computer modeling will never completely replace the need for underground tests, computing is playing an ever-increasing role to better prepare for tests and maximize their utility.

Acquisition of computer integrated manufacturing (CIM) for the laboratories is also funded under this heading. Progress to date has been very good--the complex is proceeding toward complete automated exchange of product definition information for the Trident II warhead development activities.

The following table details requested ADP acquisitions by location.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Lawrence Livermore National Laboratory (LLNL)		
Computer hardcopy output recording system (CHORS) II, Phase 2A	$ 1,500	$ 0
CHORS II, Phase 2B	0	1,000
Storage system, Phase 2A	1,000	0
Storage system, Phase 2B	0	5,000
Management information data base computer	1,000	0
CIM, Phase 4	3,000	4,200
Total, LLNL	6,500	10,200
Los Alamos National Laboratory (LANL)		
Administrative computer	0	1,500
Mass storage upgrade	3,000	1,200
Cray X/MP (2nd)	10,500	0
Cray X/MP (3rd)	0	13,650
CIM	2,000	4,200
Total, LANL	15,500	20,550
Sandia National Laboratories (SNL)		
Integrated file storage expansion, SNLA	850	0
Cray X/MP 24, SNLA	0	5,500
Alphanumeric computer output microfilm, SNLA	700	0
Open timesharing expansion, SNLA	0	1,550
Cray-1S, SNLL	3,900	0
Integrated file storage expansion - Phase II, SNLA	500	0
Networks upgrade, SNLL	0	1,100
CIM, SNLA and SNLL	2,700	4,000
Total, SNL	8,650	12,150
Nevada Operations Office		
Distributed Network	1,250	0
Total, ADP Purchases	$ 31,900	$ 42,900

Major Items of Equipment - Automatic Data Processing

Major items of automatic data processing equipment are discussed by site in the narrative below.

	FY 1987 Request
Lawrence Livermore National Laboratory	
CHORS II, Phase 2B	$ 1,000

The large volume of computation in the computers gives rise to a large volume of text and picture output to convey the results to computer users. This output is produced via several means with the vast majority of output produced by CHORS, a centralized high-speed, high-quality system producing both hardcopy paper and a variety of microfilm output. Phase 2B is needed to provide additional hardcopy capacity.

FY 1987
Request

Storage System, Phase 2B .... $ 5,000

A most critical computer network requirement is the management, movement, storage, and control of "files" - computer generated information of various forms. LLNL has developed a multilevel storage hierarchy approach as the best means of providing storage support within OCTOPUS. Failure to provide adequate on-line storage in a time frame commensurate with increases in computing capacity will seriously hamper the efficient use of the large computers and affect the programmatic efforts.

Computer Integrated Manufacturing, Phase 4 4,200

Phase 4 of this multi-year project is needed to provide expanded engineering capability. The following four areas in the weapon engineering design cycle will benefit: design/drafting; engineering modeling and analysis; manufacturing; and engineering design documentation.

Los Alamos National Laboratory

Administrative Computer 1,500

A new computer-based information system will provide laboratory-wide interactive access to all administrative information. A computer is needed to replace the existing central processor for the large data bases. It will be connected to the integrated computer network to supplement the distributed processors currently used. Vendor-supported application software has proven to be cost effective for those distributed processors. Software for the current central processor is extremely scarce and insufficient to meet the needs of the laboratory. Therefore a large, software-rich administrative computer is proposed as a key element to improve the quality and capability of the information management system.

Mass Storage Upgrade 1,200

The effectiveness of the large central machines, which is so essential to the success of our national security programs, would be severely diminished if the mass storage facility did not provide adequate response to file access request, and if it were unable to satisfy on-line and archival data storage requirements in a reliable and timely manner. This completes the funding requirements for this FY 1986 item.

Cray X/MP (3rd) 13,650

This funding provides for the cost-effective buyout of a Cray X/MP 48 leased and supported in FY 1986.

Computer Integrated Manufacturing 4,200

The request provides for additional required CIM capability. Planned acquisitions include mainframes, workstations, data storage and output equipment, and network upgrades.

Sandia National Laboratories

Cray X/MP 24 (SNLA) 5,500

This provides for a buyout of this computer installed in the laboratory in May 1985.

Open Timesharing Expansion (SNLA) 1,550

The CDC Cyber 170/855 has been converted to a new operating system which will create a virtual memory environment for users of this machine. This enhanced software capability will increase the need for central processing unit capacity, which is already strained during peak periods. At least one million words of additional memory will also be needed to support both the current and virtual modes. The postponement of this expansion would adversely affect about 2,000 [illegible]s.

	FY 1987 Request
Network Upgrade	$ 1,100

This item is for equipment to upgrade and add functionality to the scientific computer network. A scientific computing system is proposed that will increase capacity to fulfill programmatic responsibilities. In order to fully utilize this new system and to get optimal use from the present VAXs and Crays, the capabilities of the scientific computing network must also be altered and expanded.

Computer Integrated Manufacturing	4,000

This item consists of equipment to be used for computer-aided engineering (CAE) support for conceptual design simulation and verification, engineering analysis and preliminary design, design definition, manufacturing, and test. The additional equipment is required for improved weapon designs and shorter time scales. It will increase capacity and capability for computer aids to all phases of weapon development. It will add peripherals and communications networks/links necessary for an integrated CAE network. This network will link engineers, designers, analysts, parts programmers, and others who need direct access to the weapon data bases.

No major items of ADP equipment are requested for the testing program in FY 1987.

	FY 1986 Adjusted Appropriation	FY 1987 Request
CONSTRUCTION	$157,061	$186,830
Research and Development	135,661	149,830
Testing	21,400	37,000

The following is a table listing the construction line items included in the FY 1987 research, development, and testing budget request. Further details may be found in the individual construction project data sheets.

Research and Development

Project Numbers	Title	TEC	FY 1986 Adjusted Appropriation	FY 1987 Request
New Projects				
87-D-101	General plant projects, VL	$ 21,300	$ 0	$ 21,300
87-D-102	Environmental compliance and cleanup, LLNL	134,000	0	7,000
87-D-104	Safeguards and security enhancement, Phase II, LLNL	67,400	0	4,300
	Total New Projects		$ 0	$ 32,600
Prior-Year Projects				
86-D-101	General plant projects, VL	$ 19,800	$ 19,800	$ 0
86-D-103	Decontamination and waste treatment facility, LLNL	36,400	3,600	5,400
86-D-104	Strategic Defenses Facility, SNLA*	70,000	2,000	15,000
86-D-105	Instrumentation Systems Laboratory, SNLA	20,000	3,100	8,900
86-D-106	Laboratory Data Communications Center, LANL	25,000	1,000	14,000
85-D-102	Nuclear weapons research, development, and testing facilities revitalization, Phase I, VL	152,300	35,000	57,600
85-D-103	Safeguards and security enhancements, Livermore, CA	41,100	16,000	6,900
85-D-106	Hardened engineering test building, LLNL	3,130	1,800	430
84-D-102	Radiation-hardened integrated circuit laboratory, SNLA	40,500	15,500	3,000
84-D-104	Nuclear materials storage facility, LANL	18,575	11,375	0
84-D-105	Safeguards and security upgrades, Phase I, LANL	14,650	7,050	0
84-D-106	Security system upgrade, SNLA	3,800	1,900	0
83-D-199	Buffer land acquisition, Livermore, CA	33,700	9,700	0
82-D-144	Simulation technology laboratory, SNLA	40,000	10,300	6,000
	Total prior-year projects		138,125	117,230
	General Reductions and Management Initiatives		- 2,464	0
	Total research and development		$135,661	$149,830

Testing

Project Numbers	Title	TEC	FY 1986 Adjusted Appropriation	FY 1987 Request
New Projects				
87-D-101	General plant projects, VL	$ 7,700	$ 0	$ 7,700
	Total new projects		$ 0	$ 7,700
Prior-Year Projects				
86-D-101	General plant projects, VL	$ 7,700	$ 7,700	$ 0
85-D-105	Combined device assembly facility, NTS	69,500	7,000	14,000
84-D-107	Nuclear testing facilities revitalization, VL	79,240	12,900	15,300
	Total prior-year projects		27,600	29,300
	General Reductions and Management Initiatives		- 6,200	0
	Total testing		$ 21,400	$ 37,000

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*Funded jointly with DOD.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Inertial Fusion	$ 23,868	$ 23,800

The Inertial Fusion research and development previously conducted at the three weapon laboratories will be integrated into the overall weapons program. Accordingly, there is no funding for Inertial Fusion as a separate program at the weapons laboratories. The NOVA and PBFA II facilities will be used for weapons simulation and other weapons related research and development.

Three major non-DOE laboratories (KMS Fusion, the University of Rochester Laboratory for Laser Energetics, and the Naval Research Laboratory), are funded specifically as Inertial Fusion programs, since they principally focus on the inertial fusion phenomenology itself as a non-weapon physics research topic. In addition, these programs using complementary experimental capabilities, provide direct experimental support and complementary scientific data for weapons research and development using the NOVA and PBFA II facilities at the national weapons laboratories.

	FY 1986 Adjusted Appropriation	FY 1987 Request
OPERATING EXPENSES	$ 22,568	$ 22,500

This funding will allow the support laboratories to continue to support the high energy driver and target experimental campaigns being carried out at Lawrence Livermore National Laboratory, Los Alamos National Laboratory, and Sandia National Laboratories. In addition, these laboratories will continue to acquire laser/plasma physics data which are necessary to define the target characteristics and irradiation conditions required to achieve the goal of weapons physics research.

KMSF	$ 13,125	$ 12,000

In FY 1987, KMSF will continue to acquire laser/target interaction data which is useful for the high performance experimental target designs to be employed on NOVA and will continue developing a high performance target fabrication technology capability in support of ongoing inertial fusion driver and target experiments. In addition, KMSF will support the experimental program of all weapons physics fusion facilities by continuing to provide unique targets, experimental components, and diagnostics.

University of Rochester	$ 6,943	$ 8,000

In FY 1987, the University of Rochester will execute experiments designed to compress fuel masses to over 100 times liquid hydrogen density using cryogenic liquid fuel targets. The University will also continue the drive uniformity program using cryogenic targets, with expected reduction of drive non-uniformity to ± 3 percent at short wavelength irradiation and will pursue the theoretical program associated with understanding the data acquired in these experiments. The systematic acquisition of this implosion data is important to understanding drive uniformity requirements for implosion physics, and how to design and irradiate targets.

Naval Research Laboratory	$ 2,500	$ 2,500

In FY 1987, the Naval Research Laboratory plans to acquire laser/plasma interaction data and to observe plasma instability growth phenomena at increasingly greater laser power and intensities. At these higher power levels, Rayleigh-Taylor instability growth rate regimes will be more nearly characteristic of such phenomena in targets that would be imploding under actual thermonuclear burn conditions. On this basis, the systematic acquisition of physics data on the growth of such instabilities and on their influence in controlling the efficiency of a thermonuclear burn are critical to establishing the physical requirements for stable implosions.

	FY 1986 Adjusted Appropriation	FY 1987 Request
CAPITAL EQUIPMENT	$ 1,300	$ 1,300

This funding will approximately maintain the FY 1986 level and will provide funding to support the capital equipment needs for the three support laboratories.

CONSTRUCTION	$ 0	$ 0

	FY 1986 Adjusted Appropriation	FY 1987 Request
Production and Surveillance	$2,285,953	$2,502,204

OPERATING EXPENSES	$1,739,789	$1,968,504

Weapons production and surveillance activities involve the procurement of materials (exclusive of nuclear materials); fabrication and assembly of nuclear weapons and weapon components; stockpile maintenance; reliability assessment of the existing stockpile; and development of safe-secure transportation, field transportation, field training manual preparation, and facility standby/startup required to maintain the United States national defense posture as approved by the President.

This request supports the current schedules for near-term weapon deliveries, modifications, and retirements. For 1990 and beyond, the schedule also reflects the current Nuclear Weapons Stockpile Memorandum (NWSM). The delivery schedule for the W87 PEACEKEEPER warhead has been revised, consistent with language contained in the FY 1986 Defense Authorization Act, limiting warhead production to the number required to arm currently authorized missiles.

Funding for the weapons production and surveillance operating expenses activities follows:

	FY 1986 Adjusted Appropriation	FY 1987 Request
War reserve new production	$1,060,340	$1,159,426
Stockpile maintenance	195,180	193,478
Stockpile evaluation	202,880	192,600
Process development	96,900	101,600
Other costs	289,050	321,400
Unallocated	-104,561	0
Total	$1,739,789	$1,968,504

War reserve new production	$1,060,340	$1,159,426

This subactivity includes costs incurred for procurement and/or manufacture of materials, piece parts, and assemblies required in the final assembly of warheads to be delivered to the Department of Defense in direct compliance with the Nuclear Weapons Stockpile Memorandum covering the budget period as well as future years, and for production/process engineering required to support future weapons delivery.

After taking into account the effects of escalation, $46,733,000, the real growth in War Reserve New Production is $52,353,000, or 4.9 percent over FY 1986. This results from both positive and negative changes in the total workload.

Stockpile maintenance	$ 195,180	$ 193,478

This subactivity includes funding required to maintain weapons and weapon components currently in the nuclear weapons war reserve stockpile and those to be delivered to the stockpile. Included are the costs associated with repairing nuclear weapons and significantly modifying or modernizing older nuclear weapons in the stockpile. Funding is also provided to procure, fabricate, and assemble material and piece parts into weapon components which will be used to replace like components having limited life, including special nuclear materials. The costs incurred to retire and disassemble nuclear weapons from the stockpile are also funded under this subactivity. There is no growth in this area from FY 1986 to FY 1987.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Stockpile evaluation	$ 202,880	$ 192,600

This subactivity provides the funding required to assure the high quality and reliability of nuclear weapons and components in the war reserve stockpile and those products to be delivered to the stockpile. A vigorous reliability assessment program is necessary to continuously evaluate and determine that nuclear weapons are produced according to design specifications and that transportation, deployment, and storage of nuclear weapons do not result in performance, life use, maintainability, reliability, or safety degradation. Quarterly reliability reports are issued for every weapon throughout its stockpile life. This activity maintains the required level of effort in FY 1987.

Process development	$ 96,900	$ 101,600

This subactivity is directed toward (1) solving current problems and adequately supporting all current and planned production of new weapon components in Phase 3, (2) developing new processes to improve production operations by reducing process time and/or reducing attrition of materials and improving process yields, and (3) developing process and production techniques required to support necessary advanced technologies in order to provide for an efficient transition of new technologies into Phase 3 development programs for future weapons as defined by the weapons design laboratories.

This subactivity is increased by $4,700,000 in FY 1987 to reflect increased preproduction activities for systems entering production in 1989 and later. This reflects the DOE's commitment to joint laboratory/plant efforts for earlier and more intensive preproduction activities, with a goal of minimizing producibility problems when systems enter production.

Other costs	$ 289,050	$ 321,400

This subactivity provides funding for those costs incurred in the weapons production complex that are not properly defined as part of product costs. It includes (1) nuclear materials recycle and recovery activities, (2) field engineering and training activities, (3) secure transportation activities, (4) facilities startup and standby activities, and (5) other miscellaneous costs including changes in inventory balances. Also reflected is a general increase in operating expenses for the weapons program associated with the redistribution of costs resulting from maintaining the K-25 operation at Oak Ridge in a shutdown condition. The request is detailed below.

Nuclear material recycle and recovery	$ 181,550	$ 218,200
Field engineering and training activities	3,860	4,200
Secure transportation	42,845	46,900
Facility startup/standby	14,345	10,400
Miscellaneous	46,450	41,700
Total	$ 289,050	$ 321,400

A significant portion, $218,200,000, of the total funds included in the other cost category is for nuclear material recycle and recovery activities conducted at the Mound, Oak Ridge, Rocky Flats, and Savannah River weapon production facilities, and the Los Alamos National Laboratory (LANL). Tritium is recovered at the Mound Plant, enriched uranium and oralloy are recovered at Oak Ridge, and plutonium is recovered at Rocky Flats. Savannah River recovers and purifies tritium from returned reservoirs. The major cost increase in FY 1987 results from the Office of Military Application providing a greater fraction of funding support to LANL's scrap recovery and plutonium metal production activities. These costs have been shared with the Office of Nuclear Materials Production (ONMP). Because ONMP's program activities at LANL are being reduced, the production and surveillance program must assume a larger share of costs to continue to meet production and surveillance material requirements.

A related issue in this area concerns Building 371, the Plutonium Recovery and Waste Treatment Facility, at Rocky Flats. A study is currently underway to determine the need, scope, and capacity requirements for options to modify the building to correct existing deficiencies in processing capabilities. Should the Department decide to modify Building 371, it could appear as a construction line item in FY 1988.

Also included within this subactivity are field engineering, training, technical, and administrative services provided to the DOD and DOE weapon production plants by Sandia National Laboratories. FY 1987 costs are estimated to be $4,200,000, supporting the current level of effort.

The secured transportation shipments of nuclear weapons, weapon components, and all "strategic" or "trigger" quantities of all Government-owned special nuclear materials are included in this subactivity. These costs include the salaries, fringe benefits, and travel expenses of Federal couriers along with the cost of contract air and rail shipments and the maintenance of Government-owned motor vehicles. The FY 1987 costs are estimated to be $46,900,000, and reflect an increase in the number of Federal couriers. The increase in the number of couriers is required to enhance the overall security of weapons and special nuclear material shipments.

Facilities startup and standby, and decontamination and disposition of facilities costs are anticipated to be $10,400,000 in FY 1987. The decrease is attributed to the completion of the ceramics and magnetics fabrication facility at Pinellas.

The $41,700,000 in the Miscellaneous category is required to support Federal program management, the maintenance of management information systems, SACNET operations and maintenance, planning and management studies, Nuclear Weapons Response Group, as well as a $7,554,000 change in inventories. These estimates are detailed on the following table:

	FY 1986 Adjusted Appropriation	FY 1987 Request
Changes in Inventories		
Common Use Stores	$ 3,775	$ 4,438
Special Reactor Materials--Boron 10	- 2,369	- 692
Other Special Materials--Gold, Silver, and Platinum ...	3,710	3,808
Total	$ 5,116	$ 7,554
All Other		
Program Management	24,552	20,122
MIS Maintenance	7,720	6,554
SACNET	1,392	1,184
Planning and Management Studies	5,315	4,105
Nuclear Weapons Accident Response Group	2,025	2,181
Other	330	0
Total	$ 41,334	$ 34,146

Automatic Data Processing Leases

Included in the weapons production and surveillance activity is $17,360,000 for leasing automatic data processing items. Effective with FY 1987, the threshold for a major computer item has been raised from $400,000 to $1,000,000, based upon the total purchase equivalent value.

Location/Item	FY 1986 Adjusted Appropriation	FY 1987 Request
Albuquerque Operations Office, Albuquerque, NM		
General Purpose Central Processor Units (CPU's) Replacement	$ 100	$ 800
Mass Storage System	100	100
Subtotal	200	900
Bendix Plant, Kansas City, MO		
Computer Integrated Manufacturing (CIM) Production System Number 1	121	0
CPU, Memory, Channels and Upgrade	1,431	1,431
CIM Production System Number 2	1,382	1,700
CIM Production System Number 4	1,627	1,627
CIM Production System Number 6	0	1,000
Shop Floor Data Systems, Phase 4	0	500
Subtotal	4,561	6,258
Mound Plant, Miamisburg, OH		
Computer-Aided Engineering Analysis System	100	0
Technical Applications Development Analysis System	100	0
PROCODE Automated Manufacturing System	0	250
Subtotal	200	250
Pantex Plant, Amarillo, TX		
CIM Interactive Graphics System	1,700	1,200
Factory Management System	350	100
Interactive Graphics System (IGS) Computer Upgrade	0	1,000
Subtotal	2,050	2,300
Pinellas Plant, St. Petersburg, FL		
CIM System and Network, Phase I	495	0
CIM Automation	0	100
General Purpose System Replacement	0	775
Subtotal	495	875
Rocky Flats Plant, Boulder, CO		
Central Computer Replacement	1,900	1,844
CIM System Expansion, Phase 1	833	833
Subtotal	2,733	2,677
Sandia National Laboratories		
Text Editor Processor Replacement	200	400
Y-12 Plant, Oak Ridge, TN		
CIM Systems and Network, Phases 2 and 3	2,390	1,430
Central Computer Upgrade, Class IV	1,224	770
Central Facility Enhancement III	0	1,500
Subtotal	3,614	3,700
Total Automatic Data Processing Leases	$14,053	$17,360

These computers are necessary to meet the production management, process control, and numerical control activities and for administrative information processing requirements at the plants. Detailed comments follow on all new leases proposed for FY 1987.

FY 1987
Request

Bendix Plant, Kansas City, MO

CIM Production System Number 6 .... $ 1,000

The system will significantly reduce lead times to process manufacturing instructions and will improve instruction accuracy. It will allow development of standardized manufacturing methods for similar products. The system will be used for group technology/computer aided process planning which will facilitate the link between Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM). The system will be integrated into the CIM production systems which contain part definition and manufacturing data.

Shop Floor Data Systems, Phase 4 500

This will support plant-wide work-in-process reporting and production data recording in selected production departments and will improve product tracking, inventory accounting, and requirements planning. This acquisition is a continuation of the expansion of shop floor data systems to additional production departments in the plant.

Mound Plant, Miamisburg, OH

PROCODE Automated Manufacturing System 250

The FY 1987 PROCODE acquisition is an element of a phased enhancement of the automated manufacturing system. Each phase of the system will further integrate product index, production scheduling, materials planning, production manuals, and a variety of other manufacturing control activities. Such integration will minimize the manual efforts involved and save time and improve quality.

Pantex Plant, Amarillo, TX

IGS Computer Upgrade 1,000

The additional facility workload, including escalation of telecommunications requirements, will have pushed the existing IGS system to the efficiency threshold by FY 1987. This system will not only be supporting a large number of IGS work stations, but will also be supporting a balance of the plantwide classified workload. By this period. it is anticipated that additional graphic workstations, both business and technical, will be requested.

Pinellas Plant, St. Petersburg, FL

CIM Automation 100

This system is part of the total integration of Engineering and Manufacturing functions. This program involves the acquisition of advanced technology work stations/personal computers which will be available for accessing CIM systems as well as office automation functions such as spread sheet analysis, word processing, and graphics.

General Purpose System Replacement 775

Major portions of the current system will be 10 to 12 years old and reliability is less than acceptable. A new system for timesharing, transaction processing, and batch will be acquired to maintain centralized unclassified processing capability. As the unclassified load increases on the 4381-type processor acquired in FY 1985, it will be necessary to interchange its mission with this IBM 308X-type processor. This interchange of mission for the respective processor is due to the relative load forecasts for unclassified and classified data. It is planned that both machines will run the same software, permitting interchange of mission without additional conversion requirements.

	FY 1987 Request
Y-12 Plant, Oak Ridge, TN	
Central Facility Enhancement III	$ 1,500

This system is a continuation of Y-12 Central Facility equipment budgeted in prior years. This system will make available computing resources to meet the management information data storage and processing needs of the Y-12 weapons-related production facilities. This system will be used to access plant data and to meet the TRIDENT II objectives.

The request includes funding to support a Federal personnel level of 760 full-time equivalents at the following locations:

Albuquerque Operations Office	733
Oak Ridge Operations Office	33
Savannah River Operations Office	11
Total FTE's	777

	FY 1986 Adjusted Appropriation	FY 1987 Request
CAPITAL EQUIPMENT	$125,300	$132,000

The estimate for FY 1987 will provide funding for: (1) acquisition of equipment to provide a minimum capability in the production complex to meet the heavy workload; and (2) a minimum effort toward the continuing upgrading of safeguards and security capability. However, this funding level will not arrest the continuing deterioration of equipment in the production complex. The FY 1987 funding request is comprised of $17,900,000 for the purchase of computers and $114,100,000 for the acquisition of basic equipment which includes $12,394,000 for safeguards-related transportation and communications equipment.

Basic equipment	$106,050	$114,100

The increase of $8,050,000 in basic equipment funding in FY 1987 is for equipment items that are essential to halt the deterioration of the weapons production equipment base.

The transportation safeguards requirement totals $12,394,000 for FY 1987. It consists of $8,385,000 for safe and secure trailers and escort vehicles to handle the increased workload, $400,000 for the upgrade of worn ATMX railcars, $1,035,000 to maintain an effective and secure communication system, and $2,574,000 for the replacement of other operational equipment.

There is one major item of equipment: Bendix Plant - Two Centerdrive Lathes at $1,050,000 each. Bendix has the only machines of this type in the nuclear weapons complex and depends upon this capability to efficiently manufacture large case parts for the Cruise Missile, B83 Bomb, and the upcoming ASW programs. Although these machines have provided a steady performance for over 20 years, they were manufactured in 1960 and 1961 and no longer can be relied upon to support weapon schedules without extensive out-of-service periods. The original manufacturer is no longer in business and there is no commercial source for replacement parts. The existing machines will be replaced with CNC turning machines which incorporate the hollow spindle design and provide technological advantages far superior to the existing equipment. Automatic tool offset, on-machine probing, and discrete speed adjustment versus the fixed rpm settings of the current equipment will contribute to improved operations.

The purchase of new and replacement equipment for the Albuquerque Operations Office, Sandia National Laboratories, and Los Alamos National Laboratory is $13,000,000.

The remaining $86,606,000 of basic equipment funding is insufficient to halt the deterioration of equipment throughout the nuclear weapons production complex caused by substantial underfunding in recent years. The request will provide equipment restoration funds for those plants that will no longer be receiving utility and equipment restoration funding. Without adequate funding for capital equipment, the utilities and equipment restoration effort will be delayed beyond the planned nine-year program. This delay will cause uncertainties in planned workloads and delivery commitments and will ultimately increase the cost of restoration efforts.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Automatic Data Processing Equipment	$ 19,250	$ 17,900

Included in the weapons production and surveillance activity is $17,900,000 for automatic data processing items. Effective with FY 1987, the threshold for a major computer item has been raised from $400,000 to $1,000,000 based upon the total purchase equivalent value.

Location/Item	FY 1986 Adjusted Appropriation	FY 1987 Request
Albuquerque Operations Office, Albuquerque, NM		
Mass Storage System	$ 0	$ 900
Bendix Plant, Kansas City, MO		
General Purpose CPU Replacement, Phase 1	5,100	0
Facilities CAD Systems	0	1,000
Shop Floor Data Systems, Phase 3	0	2,000
General Purpose CPU Replacement, Phase 2	0	1,700
Subtotal	5,100	4,700
Mound Plant, Miamisburg, OH		
CIM Systems and Network, Phase 3	1,300	0
Additional CCF System	3,850	0
Computer Aided Engineering Analysis System	750	0
Technical Applications Development Analysis System	550	0
CIM Systems and Network, Phase 4	0	1,000
Subtotal	6,450	1,000
Pantex Plant, Amarillo, TX		
Factory Management System	0	2,500
Secured Networking Capability	0	1,050
Subtotal	0	3,550
Pinellas Plant, St. Petersburg, FL		
CIM Systems and Network, Phase 2	1,050	0
Unclassified Computer Upgrade	450	0
Subtotal	1,500	0
Rocky Flats Plant, Boulder, CO		
Data Collection Network	4,000	0
CIM Replacement System	0	2,000
Subtotal	4,000	2,000
Y-12 Plant, Oak Ridge, TN		
CIM System and Network Expansion 2	2,200	0
Central Facility Enhancement 5	0	2,550
CIM System and Network Expansion 3	0	3,200
Subtotal	2,200	5,750
Total ADP Purchases	$19,250	$17,900

These items are required to support production management for process and numerical control activities and for administrative information processing in the weapons production complex. Items proposed for acquisition in FY 1987 are discussed in the following narrative:

FY 1987
Request

Albuquerque Operations Office, Albuquerque, NM

Mass Storage System .... $ 900

This system will provide the capability for the economical gathering and storage of production data in a long-term storage media. The system will enhance the operations office's ability to meet the requirements of scheduling, monitoring, and controlling nuclear weapons production activities.

Bendix Plant, Kansas City, MO

Facilities CAD Systems .... $ 1,000

This system is additional capacity. The system will also significantly enhance the capabilities and productivity of personnel performing plant facilities, layout, space management, facilities engineering, utilities engineering, resource planning, plant maintenance, and facilities project estimating. Implementation of the computer-aided drafting system will improve drafting productivity in the Facilities, Utilities, and Engineering Maintenance organizations by at least two to one.

Shop Floor Data Systems, Phase 3 2,000

The system will support plant-wide work-in-process reporting and production data recording in selected production departments and will improve product tracking, inventory accounting, and requirements planning. This acquisition is a continuation of the expansion of shop floor data systems to additional production departments in the plant.

General Purpose CPU Replacement, Phase 2 1,700

This item will provide the necessary capacity to support the projected computing workload until FY 1988 when an additional mainframe computer is planned. This expansion will primarily consist of additional storage devices for use with the General Purpose Computer System.

Mound Plant, Miamisburg, OH

CIM Systems and Network, Phase 4 1,000

The proposed equipment represents an expansion to the plant's CIM Network. The mini-computer based information system will streamline and automate the quality control responsibilities for collecting operations data, developing statistical data analysis, and preparing formal written reports. The enhancements to the Technical Applications Development System will provide enhanced access to the system and increase the number of users by approximately 30 employees.

Pantex Plant, Amarillo, TX

Factory Management System 2,500

This system will perform planning, monitoring, and control of manufacturing processes. The system will merge bill of material listings into production documents. The system will be linked so that parts and assembly associations can be processed immediately in stores. Component receipts, issues, and returns; tester and gage control information; personnel certifications and work assignments; quality data; and scheduling information will be monitored, analyzed, and controlled through the system.

Secured Networking Capability 1,050

Secured networking capability is required to provide security control for the high speed distribution weapons information. Communications requirements between central processors, distributed processors, and communication interfaces will depend on this system. This system is required as part of the integrated nuclear weapons complex CIM wide band communications network to meet the nuclear weapons production workload.

	FY 1987 Request
Rocky Flats Plant, Boulder	
CIM Replacement System	$ 2,000

This system will provide the capacity needed to accommodate solids modeling, finite element analysis, and over fifty design stations for TRIDENT II and MX production. Capacity requirements analyses have been conducted which confirm the requirement for this acquisition. In addition, there is a requirement to provide redundant large scale computing capability and backup computing facilities.

Y-12 Plant, Oak Ridge, TN

Central Facility Enhancement 5 2,550

This system constitutes the purchase of a central file storage system and associated CPU and communications equipment and interfaces to support the full implementation at Y-12 of the DOE CIM Nuclear Weapons Network and the plant's internal data and information storage needs. This system will provide adequate control for the electronic interchange of data with other nuclear weapons facilities, eliminating the manual processes now in place and the delays inherent in such operations.

CIM Systems and Network Expansion 3 3,200

The equipment will be employed to increase productivity, decrease long-term capital and operating expenditures, and minimize personnel requirements for increased production schedules. The system will provide computer-aided process planning, procedure generation, and automatic collection and distribution of critical manufacturing and certification information. The system will enhance the plant's ability to provide production and certification of weapons components, associated design and fabrication functions, and other support activities to keep pace with technological demands created by advanced weapon systems design and experimentation.

	FY 1986 Adjusted Appropriation	FY 1987 Request
CONSTRUCTION	$ 420,864	$ 401,700

Following is a table listing the construction items included in the FY 1987 production and surveillance budget. Detailed description and justification information for each project is presented in the construction project data sheets.

Project Numbers	Title	TEC	FY 1986 Adjusted Appropriation	FY 1987 Request
	New Projects			
87-D-121	General plant projects, VL	$ 32,000	$ 0	$ 32,000
87-D-122	SRAM II warhead production facilities, VL	55,000	0	5,000
87-D-123	Protective clothing decontamination facility, Rocky Flats	5,200	0	500
87-D-127	Environment, safety, and health upgrade, Mound	4,300	0	2,400
87-D-130	Receiving and shipping facility, Pinellas	2,700	0	300
	Total new projects		$ 0	$ 40,200

Project Numbers	Title	TEC	FY 1986 Adjusted Appropriation	FY 1987 Request
Prior-Year Projects				
86-D-121	General plant projects, VL	$ 28,700	$ 28,700	$ 0
86-D-122	Structural upgrade of existing plutonium facilities, Rocky Flats	5,600	2,820	2,600
86-D-123	Environmental hazards elimination, VL	39,000	7,240	18,300
86-D-124	Safeguards and site security upgrading, Phase II, Mound	5,000	1,880	3,000
86-D-125	Safeguards and site security upgrading, Phase II, Pantex ...	10,000	1,410	8,500
86-D-130	Tritium loading facility replacement, Savannah River ...	120,000	4,700	30,000
85-D-112	Enriched uranium recovery improvements, Y-12 Plant, ...	52,000	12,500	21,800
85-D-113	Power plant and steam distribution system, Pantex	27,200	12,690	7,600
85-D-115	Renovate plutonium building utility systems, Rocky Flats	35,100	16,640	14,500
85-D-121	Air and water pollution control facilities, Y-12 Plant	29,000	13,160	10,000
85-D-123	Safeguards and site security upgrade, Phase I, Pantex	5,000	2,820	1,000
85-D-124	Safeguards and site security upgrade, Phase II, Rocky Flats	3,260	2,260	0
85-D-125	Tactical bomb production facilities, VL	35,800	9,000	14,800
84-D-112	TRIDENT II warhead production facilities, VL	158,500	60,700	14,500
84-D-113	Antisubmarine warfare/standoff weapon warhead production facilities, VL	125,700	5,000	47,000
84-D-115	Electrical system expansion, Pantex	14,480	5,920	0
84-D-117	Inert assembly and test facility, Pantex	13,280	5,080	0
84-D-118	High explosive subassembly facility, Pantex	40,000	31,020	0
84-D-120	Explosive component test facility, Mound	21,300	7,710	0
84-D-124	Environmental improvements, Y-12 Plant	45,400	11,280	10,000
84-D-211	Safeguards and site security upgrading, Y-12 Plant	68,000	12,220	30,000
84-D-212	Safeguards and site security upgrade, Pinellas	7,500	4,370	1,000
82-D-107	Utilities and equipment restoration, replacement, and upgrade, Phase 3, VL	1,042,000	152,250	116,900
82-D-109	155mm Artillery Fired Atomic Projectile (AFAP) production facilities, VL	40,000	15,000	10,000
82-D-111	Interactive graphics systems, VL	22,000	4,230	0
	Total prior-year projects		430,600	361,500
	General Reductions and Management Initiatives		- 9,736 a/	0
	Total production and surveillance		$420,864	$401,700

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a/ $1,000,000 was applied to new budget authority on Project 84-D-120, making general and Management Initiative reductions of $10,736,000.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Program Direction	$95,100	$60,550
OPERATING EXPENSES	95,100	60,550

Included within the Weapons Program Direction request is funding to support the following areas:

- Office of the Assistant Secretary for Defense Programs
- Deputy Assistant Secretary for Military Application
- Albuquerque Operations Office
- Nevada Operations Office
- Community Assistance Program at Los Alamos, New Mexico

Office of the Assistant Secretary for Defense Programs (OASDP)

The Office of the Assistant Secretary for Defense Programs provides overall direction and administration of Defense Programs activities to assure that operations are conducted in the most efficient manner consistent with Defense Programs mission objectives. Some specific support functions carried out by this office include:

- overall management of activities related to the accomplishment of the Defense Programs mission;
- advising the Secretary of Energy on national security matters;
- providing senior management program direction and guidance;
- coordination of the development of Defense Programs plans and budgets;
- review of congressional proceedings and legislation impacting Defense Programs and development and coordination of Defense Programs congressional testimony preparation and presentation;
- providing the Assistant Secretary with information regarding the effectiveness of national security nuclear weapons development and production activities;
- management of the long-range planning process of the laboratories and Defense Programs participation in the Department's Institutional Planning Process;
- management of Defense Programs manpower utilization and allocation function;
- development, implementation, coordination, and management of the Assistant Secretary's policy analysis program;
- reviewing, coordinating, commenting on, and making recommendations on Department of Energy activities, orders, and reports that affect Defense Programs management and planning;
- exercising responsibility for the energy and utility management program within the Defense Programs complex, maintaining cognizance over field office/contractor energy/utility management activities, and maintaining contacts with the Department of Energy's energy organization;
- oversight of the safeguards and security policy and protection programs of the Department of Energy; and
- analyses of the effectiveness of safeguards and security systems through a process of inspection, evaluation, assessment, and recommendations to the Assistant Secretary for Defense Programs concerning findings that are significant to the management of Defense Programs activities.

Office of the Deputy Assistant Secretary for Military Application

Program management and support functions performed by the Office of Military Application and the Office of Inertial Fusion personnel in support of the overall objectives of the weapons program and the inertial fusion program include:

- program management, direction, and support;
- development of program goals and objectives;
- monitoring, evaluation, and approval of mainline research efforts at the weapons laboratories;
- formulation of plans and budgets for program accomplishment;
- presentation and defense of the proposed budgets to the President and the Congress;
- conduct of studies, analyses, and evaluations to assure proper program accomplishment;
- coordination of programs with other field offices, Federal agencies, the Office of Management and Budget, Congress, and numerous contractors;
- management of the nuclear weapons complex in an effective and efficient manner; and
- execution of plans and directives for development and production of nuclear weapons.

Albuquerque Operations Office (AL)

The Albuquerque Operations Office's primary goal is to continue the effective management and oversight of the weapons research, development, and production programs. An integral part of this effort is the coordination and integration of weapons program activities at Sandia National Laboratories, the Los Alamos National Laboratory, and the Lawrence Livermore National Laboratory; weapons production contractors consisting of Rockwell International, Mound Plant, General Electric Corporation, Mason and Hanger-Silas Mason Company, Inc., and the Bendix Corporation; and the participation of Oak Ridge and Savannah River Operations Offices in assigned portions of the weapons production program. Other goals are the safe transport of all government-owned strategic quantities of special nuclear materials and the effective management of all assigned program and project activities including energy and nonweapons programs. To accomplish these goals, AL requires a Headquarters operation, seven satellite area offices, and two support offices within the Continental United States.

AL's major objectives are the successful execution, through Federal personnel and contracting, of assigned programs for manufacturing, quality assurance, safety, and transportation of nuclear weapons; the planning, scheduling, distribution, and transportation of all shipments of government-owned strategic quantities of special nuclear materials and other toxic nuclear materials not related to the weapons program and not covered by Nuclear Regulatory Commission license; and the management of assigned energy-related and nonweapons programs. AL has been assigned lead mission responsibilities for the weapons production and surveillance program. Together with nuclear research, development, and testing at Sandia and Los Alamos National Laboratories, AL and its production contractors perform the major role in the Department's defense programs.

To carry out their assigned mission, AL uses the services of government-owned, contractor-operated facilities located throughout the United States, employing more than 30,000.

Nevada Operations Office

The Nevada Operations Office is responsible for managing the Nevada Test Site, currently the only area in the United States approved for underground nuclear testing. This responsibility consists of providing the Government-owned facilities site engineering, construction, and logistical support for conducting nuclear testing. These objectives are accomplished by the utilization of a small cadre of Federal employees who provide management oversight of the work being performed by contractor personnel.

Community Assistance Program

The Department of Energy administers the Community Assistance Program under Section 91 of Public Law 94-187, the Atomic Energy Community Act of 1955, as amended, to provide assistance to specified units of local government in the community associated with the Los Alamos National Laboratory. The purpose of the assistance is to: (a) compensate the Los Alamos community for its lack of an industrial or commercial tax base; (b) attract and retain employees at the Federal energy facilities; and (c) assist in achieving financial independence. The Department of Energy has implemented Section 91 by entering into five-year contracts with Los Alamos County and the Los Alamos County School Board, utilizing the funding formula adopted in 1979 by the Department of Energy Working Group on Community Assistance. To insure satisfaction of the statutory requirement that the community makes full use of its own resources, the Department has entered into an agreement with the Los Alamos County to finance projects designed to reduce the long-term dependence on assistance from the Department of Energy. This financing is in the amount of 5 percent of the assistance payments computed by the contract formula for Los Alamos County, to be matched by equal amounts from the recipients. The FY 1987 budget assumes that all commitments to the Oak Ridge Community under the provision of Section 91 of the Atomic Energy Community Act of 1955 have been fulfilled through the lump-sum payment of $35,000,000. No further payments will be made to the Oak Ridge Community.

Program Direction Funding Requirements

The total operating funds, which provide for the salaries, other personal services, benefits, travel expenses, and contractual services for 838 full-time equivalents, plus assistance payments to the Los Alamos Community, are presented in the following table:

	FY 1986 Adjusted Appropriation	FY 1987 Request
Office of the Assistant Secretary for Defense Programs	$ 4,784	$ 7,600
Office of the Deputy Assistant Secretary for Military Application	5,415	5,860
Albuquerque Operations Office	27,620	29,745
Nevada Operations Office	8,436	9,250
Community Assistance Program - Los Alamos	7,712	8,095
Community Assistance Program - Oak Ridge	41,133	0
Total	$95,100	$60,550

These funds provide for the salaries, other personal services, benefits, travel expenses, and contractual services for the following levels of Federal employees:

	FY 1986 Adjusted Appropriation	FY 1987 Request
Office of the Assistant Secretary for Defense Programs	59	68
Office of Deputy Assistant Secretary for Military Application	105	105
Albuquerque Operations Office	517	517
Nevada Operations Office	145	148
Total	826	838

Federal Manpower Funding

Funding associated with the requested positions for salaries and other personal services, benefits, and travel is outlined below:

	FY 1986 Adjusted Appropriation	FY 1987 Request
Office of the Assistant Secretary for Defense Programs	$ 2,796	$ 3,900
Office of the Deputy Assistant Secretary for Military Application	5,305	5,710
Albuquerque Operations Office	22,957	23,476
Nevada Operations Office	6,715	7,090
Total	$37,773	$40,176

A summary by object class follows:

	FY 1986 Adjusted Appropriation	FY 1987 Request
Salaries and other personal services	$30,653	$32,381
Benefits	4,268	4,595
Travel	2,852	3,200
Total	$37,773	$40,176

Contractual Services

Funding is also included for those contractual services and supplies necessary to support the annual administrative requirements for operations at the following locations:

	FY 1986 Adjusted Appropriation	FY 1987 Request
Office of the Assistant Secretary for Defense Programs	$ 1,988	$ 3,700
Office of the Deputy Assistant Secretary for Military Application	110	150
Albuquerque Operations Office	4,663	6,269
Nevada Operations Office	1,721	2,160
Total	$ 8,482	$12,279

The major portion of the requested increase is attributable to the Inspection and Evaluation Program that is the responsibility of the Office of the Assistant Secretary for Defense Programs. Contractual services are a necessary and critical element of the Inspection and Evaluation operation. These funds enable the necessary technical assistance for planning and conducting the highly visible and necessary inspections of DOE field offices and related facilities. The inspections are required in order to evaluate the effectiveness of safeguards and security within the DOE community. In order to provide the expert consultants from the various disciplines necessary to conduct the inspections, $2,100,000 will be required. Additional technical support and laboratory services for inspections are also required.

In addition, $1,600,000 is requested in FY 1987 to provide support services in the areas of information systems planning, automated office support services, graphics support, and other special analytical tasks. It is also necessary to purchase automated office support workstations. At Headquarters, $150,000 is allocated for personnel training requirements and certain other miscellaneous expenses such as graphics, printing, leased equipment, and contractual computer programming services.

At the Albuquerque Operations Office, with the exception of communications and utilities, all other supplies, materials, and services were escalated at seven percent, communication costs were escalated at fourteen percent, and utilities were escalated at ten percent. Mountain Bell services have increased in connection with circuit lines from Kirtland Air Force Base to the Los Alamos National Laboratory. This cost is for a monthly lease of a wideband circuit to provide voice and data circuits in support of the weapons program activities between the Albuquerque Operations Office and the Los Alamos National Laboratory. Additional contracting out of support services such as security escort service, word processing, and ground maintenance will occur in FY 1986 and FY 1987. In FY 1986 and FY 1987, $300,000 is included for the DOE Telecommunications operational models (OPMODEL). This provides funding for AL's share of the lease and maintenance costs of the earth stations and terrestial circuits.

At the Nevada Operations Office, utilities will be 20 to 25 percent higher because of the increase of square footage charged to DOE. The local power company has been awarded a rate increase by the Public Service Commission. Also, telephone charges have increased due to the installation of a new telephone system and FTS charges are higher because of the deregulation and divestiture of AT&T. Printing and reproduction is provided by contractors. Jobs which exceed Nevada's capabilities are sent to the Mercury, Nevada Printing Plant. Considering inflation and other cost increases which may occur, an 8 to 10 percent increase is anticipated. Other areas that are funded under contractual services are janitorial and custodial services, computer services, guard services, word processing services, and maintenance of equipment.

JUSTIFICATION FOR COMMUNITY ASSISTANCE PAYMENTS

The requested level of funding for the Community Assistance Program will support the Department's obligations under assistance contracts with the Los Alamos entities as follows:

	FY 1986 Adjusted Appropriation	FY 1987 Request
Los Alamos		
Civic Activities	$ 30	$ 30
County:		
Assistance Payments	2,116	2,221
Schools--Assistance Payments	5,566	5,844
Subtotal	7,712	8,095
Oak Ridge		
Assistance Payments:		
City of Oak Ridge	22,254	0
Anderson County	9,512	0
Roane County	9,367	0
Subtotal	41,133	0
Total	$48,845	$ 8,095

The estimate of $30,000 for civic activities at Los Alamos is requested to cover the cost of maintaining Federal facilities located in the community. The requested amounts for assistance payments will fund the Department of Energy's obligation, as determined in accordance with the formula described in the contracts with the county and the schools, based on the provisions of the Atomic Energy Community Act of 1955, as amended. The financial assistance estimates are derived by a formula recommended by the Department of Energy Working Group on Community Assistance.

All commitments to the Oak Ridge Community under the provision of Section 91 of the Atomic Energy Community Act of 1955 have been fulfilled through the lump-sum payment of $41,133,000. No further payments will be made to the Oak Ridge Community.

JUSTIFICATION FOR INCREASE IN FEDERAL MANPOWER

The requested increase of 12 full-time equivalent Federal personnel includes the following:

Office of the Assistant Secretary for Defense Programs	9
Nevada Operations Office	3
Total	12

Office of the Assistant Secretary for Defense Programs

Ten additional full-time equivalents in the Office of the Assistant Secretary for Defense Programs are required to adequately support the enhanced inspection and evaluation activity. The increasing number of performance-oriented inspection topics, together with the expansion of both depth and scope of effectiveness exercises, have contributed to the increased staffing requirements. The rate of reinspections has increase, and there are contractor oversight responsibilities associated with the inspection and evaluation support.

Nevada Operations Office

Three additional FTE's are requested as follows:

Contracts and Procurement Division

Due to Nevada staff becoming more responsible for high dollar value procurement rather than contractor actions, since these would be taxable, an additional contract management position is required in the Contracts and Procurement Division.

Finance Division

Because of the increasing policy and procedures requirements issued in the new Presidential Procurement and Accounting Initiative, two additional positions are requested in the Finance Division. This Division reviews, evaluates, and recommends proper procedures to assure compliance with these new regulations.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-101

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 1st Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: None
Date:

6. Current cost estimate: $29,000
Date: 1/86

7. Financial schedule

Fiscal Year	Obligations	Costs			
		FY 1985	FY 1986	FY 1987	After FY 1987
Prior to FY 1985	$ 0	$12,777	$ 5,255	$ 1,658	$ 0
1985	26,500	5,818	9,850	10,832	0
1986	27,900	0	8,400	11,200	8,300
1986 Sequestered	(400)	(0)	(400)	(0)	(0)
1987	29,000	0	0	8,700	20,300

8. Brief physical description of project

This project provides for general plant improvements involving minor new construction. The work to be performed will include such activities as construction or roads, utilities, minor structures, capital alterations and additions, and technical facilities required for the operation of weapons program installations.

This project covers requirements of the weapons research and development facilities (Los Alamos National Laboratory, the Lawrence Livermore National Laboratory, and the Sandia National Laboratories (SNLA and SNLL)), and the nuclear weapons testing facilities (the Nevada Operations Office and its contractors).

9. Purpose, justification of need for, and scope of project

A general plant project (GPP) is necessary to meet new and changing program developments, to correct deficiencies, and for minor utility and road construction. Research developments and changes in technical program requirements frequently result in the need for altered or new construction items not previously anticipated. In the past, these changes have included building alterations or additions to house new equipment for research, development, and testing functions; construction of new small buildings; extensions or modifications to utilities; and general area development.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-101

9. Purpose, justification of need for, and scope of project (contd.)

The weapons GPP estimate for FY 1987 of $29,000,000 provides the level of effort essential to meet the existing programmatic requirements, requirements for maintenance and replacement due to the aging of the plant facilities and utilities, and other capital facilities. Adequate levels of GPP funding are essential to halt the ongoing deterioration of the capital base. A large backlog of critically required GPP currently exists and continues to grow because of past underfunding in this area. The FY 1987 request represents the minimum level of funding to support general plant requirements.

The following subprojects are only examples of items of work which may be performed at the major locations covered under this project. These are grouped by location and under the following reason-of-need categories: Health, Fire, and Safety; Programmatic Needs; Pollution Abatement; Maintenance; Safeguards and Security; and Other.

The preliminary estimate of FY 1987 requirements by major area is as follows:

Weapons Research and Development	
Los Alamos National Laboratory	$ 7,100
Lawrence Livermore National Laboratory	7,100
Sandia National Laboratories	7,100
Nuclear Weapons Testing	
Nevada Operations Office	7,700
Total	$29,000

Los Alamos National Laboratory .... $ 7,100

(1) Health, Fire, and Safety

a. Fire Protection Improvements .... $ 900

This work consists of providing and installing automatic suppression system in building at various laboratory sites. This work is needed to comply with Life Safety and OSHA regulations.

Subtotal - Health, Fire, and Safety .... $ 900

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(2) Programmatic Needs

a. Data Processing Interpretation Building .... $ 550

This project will provide a building, with related utilities and finished interior, to house an 800-square foot vault for the Los Alamos radiochemical data on nuclear tests. Recent expansion of mass spectrometry application to new detectors and future expansion into gas diagnostics requires this additional space for data handling.

b. Gas Analysis Laboratory .... $ 700

This project will provide a facility for rare-gas analysis. This is a new effort in direct support of the weapon test program to measure thermonuclear yield of underground tests.

c. HE Contaminated Trash Incinerator .... $ 200

This new incinerator will be used to dispose of HE contaminated trash generated in the S-Site exclusion area. The construction will consist of a screened superstructure on a concrete burn pad with access roads for dumping and cleanout activities.

The existing incinerator needs extensive repairs and is difficult to clean.

d. Magazines, Explosives Storage .... $ 150

The current load capacity for explosives storage has caused a problem with redistribution of the load limits. This project will provide two unheated magazines for large explosive-storage to accomodate increased usage by pre-Phase 3 and Phase 3 weapons programs.

Subtotal - Programmatic Needs .... $ 1,600

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 87-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(3) Pollution Abatement

e. Pit Exhaust System .... $ 100

This project will install a new High Efficiency Particlate Air (HEPA) filter plenum with a 30-foot stack for a large covered pit containing storage tanks for process waste. Presently, the HEPA filter plenum is located in the pit and filtered radioactive contaminants discharge at ground level next to a parking lot. This will provide personnel using the parking area sufficient protection from exposure to unfiltered exhaust.

Subtotal - Pollution Abatement .... $ 100

(4) Maintenance

a. Heating System Modification .... $ 650

A new heating system will replace the existing system which has deteriorated to the point of providing inadequate temperature control for machining and forming explosives. This new system will be equipped with control valves, coil units, and room thermostats for each machine and control room throughout the building.

b. Underground Steam and Condensate Line Replacement .... $ 350

This project will replace approximately 4,000 lineal feet of steam and condensate lines, insulation, and condensate pumps which have deteriorated. The steam from these lines is used for processing materials as well as heating the facilities. Frequent leaks in these lines have an adverse effect on the operation and costs of the site.

c. Heavy Equipment Shop Addition .... $ 600

The current shop was not designed or constructed for heavy equipment maintenance and repair. This building addition will include skylights over maintenance bay areas, a forced-air heating system, a ventilation system, work area outlets, lighting, and an overhead crane for engine removal. This addition will increase productivity and operational efficiency for repair and maintenance of heavy equipment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-101

9. Purpose, justification of need for, and scope of project (contd.)

d. Automatic Vehicle Wash .... $ 250

This project would provide for an automatic vehicle wash which would include an undercarriage wash, rust inhibitor, and a water-recovery system. Currently 12 vehicles are washed per day; this new facility would wash 80 vehicles per day. The improved service would reduce vehicle rust, improve maintenance, and should prove cost effective.

e. Palletized Material Storage .... $ 150

This project will construct an enclosed three-sided building to store palletized material. Currently, the warehouse is overcrowded and the overflow of the palletized materials is being stored outdoors making them vulnerable to the elements.

f. Electrical Upgrade .... $ 300

This project will replace a substation and associated electrical item such as transformers, breakers, and motor control centers serving one of the radiochemistry buildings. This electrical equipment is old and outdated, which increases maintenance costs and decreases its reliability.

g. Electrical Distribution System .... $ 600

This project will begin to replace and/or upgrade electrical distribution systems at various locations throughout the Laboratory. The old and obsolete equipment to be replaced includes switchgear, motor control centers, dedicated site control circuits, and associated wiring and conduit. Facilities and programmatic operations are affected due to lack of additional power and unreliable distribution equipment.

Subtotal - Maintenance .... $ 2,900

(5) Other

a. Printing and Photocomposition Plant .... $ 750

This facility will house the printing and photocomposition Laboratory-wide support service. Due to increased publication activities at the Laboratory and the addition of state-of-the-art equipment, the printing and photocomposition activities have become extremely overcrowded, creating an unsafe working environment. This support service plays a major role in Laboratory operations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-101

9. Purpose, justification of need for, and scope of project (contd.)

b. Two-story Office Building .... $ 850

This project will construct a building to house personnel from the Theoretical Division. Due to overcrowded working conditions, staffing has been difficult and University senior scientists have been denying visitors because of the lack of work space. This Division's missions have been severely affected.

Subtotal - Other .... $ 1,600

Lawrence Livermore National Laboratory .... $ 7,100

(1) Health, Fire, and Safety

a. Air Intake and Exhaust .... $ 200

This project will install a ventilation system that will prevent fume hood exhausts from re-entering through the air intake in the Chemistry Building.

b. Fire Sprinkler System .... $ 500

Several buildings will have fire sprinkler systems installed. This will prevent a significant loss of property should a fire occur.

c. Berms and Asphalt Surfaced Yard Area .... $ 200

This project will construct berms and an asphalt surfaced yard area of approximately 45,000 square feet to contain any accidental leakage of stored toxic waste liquids.

Subtotal - Health, Fire, and Safety .... $ 900

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(2) Programmatic Needs

a. Mechanical Technician Shop Addition	$ 200

This addition will provide space for machine tools and an area for receiving and temporary storage. This facility has experienced a dramatically increased workload that has created an overcrowded condition in the technicians' shop and receiving area.

b. Administrative Computer Center	$ 700

This project will add an addition to an existing building to house a new computer system. The interior floor construction would consist of a standard computer room sub-floor covered by raised floor tiles. Also included would be sprinklers, smoke and fire detection systems, and under floor water detection.

c. Optics Storage and Test Facility	$ 970

This project would consist of a pre-engineered metal "Butler" type building. There is a need for an Optics Facility for the storage and testing of optical components.

d. Plating Development Laboratory	$ 700

This project is a two-story addition to the Plating Shop. It will provide space for an experimental plating development laboratory with a prototype development area, a test and evaluation area, a photo-chemical machining room, and a quality control area. This facility is needed to satisfy programmatic requirements such as electroforming small pin holes for diagnostic devices used in nuclear tests, electroform copper-gold alloys, solid state bonding of unusual metals using electro-deposited coatings, and other plating experimental projects.

e. Electronic Microfabrication Facility	$ 980

A new building to house the electronics microfabrication activities will be built. The activities are currently housed in several locations. The consolidation would improve the environmental conditions and efficiency.

Subtotal - Programmatic Needs	$ 3,550

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(3) Maintenance

a. Reconstruct South Entrance Drive .... $ 700

This project will reconstruct the South Entrance Drive from the guard gate kiosk to the inner loop road. The existing roadway does not have the structural support necessary to provide satisfactory service for vehicles without constant repairs.

b. Chiller Upgrade .... $ 400

The existing chiller unit in the main machine shop will be replaced with a larger capacity chiller and modify the piping system. The increased fabrication requirements have exceeded the capability of the present system.

Subtotal - Maintenance .... $ 1,100

(4) Other

a. Communication Ducts .... $ 800

This project will install 3,000 feet of underground ducts to the North East area for telephone and data communication. All other ducts to this area are filled to capacity.

b. Feeder Substation, East Area .... $ 750

New electrical ducts, manholes, and cables will be installed from the main substation to the new switchgear. This will provide necessary electrical power requirements for the area.

Subtotal - Other .... $ 1,550

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 87-D-101

9. Purpose, justification of need for, and scope of project (contd.)

Nevada Operations Office .... $ 7,700

(1) Health, Fire, and Safety

a. Respirator Facility, Area 6 .... $ 550

This project will provide a prefabricated metal building containing a large shop area for servicing and storing respiratory protective equipment. The existing facility is too small for current operations.

Subtotal - Health, Fire, and Safety .... $ 550

(2) Programmatic Needs

a. Geophysical Logging Support Facility .... $ 990

This project will construct a pre-engineered metal building with varying eave heights. It will be equipped with a heavy duty overhead crane for manipulating logging tools and special equipment. Laboratory and office space also will be provided.

b. Install Backup Chiller, CP-1 .... $ 330

This project will provide a backup 100-ton centrifugal water chiller in the basement of CP-1. This backup will prevent loss of air-conditioning to electronic and computer equipment when a breakdown occurs or maintenance is required.

c. Rad-Safe Storage Facility, Area 6 .... $ 250

This project will provide a centralized storage area for radiological equipment and supplies used in Area 6. The consolidation of several smaller, scattered storage areas will provide a more efficient operation.

d. Building Modifications, Area 23, Mercury .... $ 330

This project provides additional refrigerated food storage adjacent to the cafeteria storeroom. Due to increased customer counts, additional refrigerated storage is required to improve inventory and quality assurance controls, reduce waste, and ensure proper food rotation.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-101

9. Purpose, justification of need for, and scope of project (contd.)

e. Cable Testing Facility, Area 23 .... $ 750

This project provides a building for cable inspection and testing, and fiber optics laboratory. The existing facilities consist of old delapidated trailers and a prefabricated metal building. This will centralize their functions for improved safety and operation.

Subtotal - Programmatic Needs .... $ 2,650

(3) Pollution Abatement

a. Sewage System Modification, Area 6 .... $ 580

This project will provide four sewage lagoons for the treatment of sanitary wastes. The existing system has become inadequate with increased usage, and there is insufficient room for its expansion.

b. Sewage System Modification, Area 12 .... $ 840

This project will construct four sewage lagoons (larger than those for Area 6) for the treatment of sanitary wastes. The existing system can no longer meet the demand, and there is insufficient room to expand it.

Subtotal - Pollution Abatement .... $ 1,420

(4) Maintenance

a. Water Distribution Upgrade, Area 12 .... $ 600

This project will replace 17,500 feet of deteriorated 4-inch diameter pipe. The replacement of the existing line will insure an adequate water supply for Area 12.

b. Water Storage, Area 6 .... $ 350

A new 500,000 gallon storage tank will ensure a continuous water supply while the existing tank is being repaired, thus serving as a backup and providing for increased storage capacity.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-101

9. Purpose, justification of need 'or, and scope of project (contd.)

c. Water Storage, Area 12 .... $ 380

This project provides a 500,000 gallon storage tank for increased storage capacity in the Area 12 and Area 2 water supply system.

Subtotal - Maintenance .... $ 1,330

(5) Safeguards and Security

a. Security Upgrades and Fences, CP-1 Complex, Area 6 .... $ 900

This construction project is to upgrade the security facilities with an improved and expanded fence; inclusion of CP-40 and the aerial response facility within the security area; and provision for alarm, closed-circuit television, and improved lighting systems.

b. Device Systems Building .... $ 850

This facility will provide a classified area for the assembly and pre-alignment of the device system pedestal and auxiliary system canister. The increased event capacity of the ATLAS facility has required the device system assembly area to handle twice its current capacity.

Subtotal - Safeguards and Security .... $ 1,750

Sandia National Laboratories .... $ 7,100

(1) Programmatic Needs

a. New Security/Emergency Control Center, Area V, SNLA .... $ 600

This project will replace an existing guard building erected over 20 years ago. The building serves two main functions--the entry and exit control point for personnel and vehicles and the Area V emergency control center. The current building is congested and is entirely too small for emergency operations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 87-D-101

9. Purpose, justification of need for, and scope of project (contd.)

b. Linac Facility, SNLL .... $ 1,000

This project will construct a building to house the 9 MEC Linear Accelerator. It is needed for nondestructive testing to support weapon component development and weapon testing.

c. Environmental Chamber Facility, SNLL .... $ 1,000

An environmental test building is required to house new improved environmental chambers. The new chambers will provide greater test ranges and more precise control to support the stringent test requirements for weapons system components.

d. Emergency Generator Building, Tonopah Test Range (TTR) .... $ 500

This project will replace an inadequate 25-year-old building and improve the backup power system for the TTR Control Point area. It would include a second 500KW diesel-powered generator and modern switching and control equipment. The building will also house the pumps and other equipment for the Control Point fire protection system.

e. Library Addition to an Existing Building, SNLA .... $ 1,000

This project will provide a needed addition to the building. This addition will provide space to consolidate scattered collection, to expand the reports section, and space for computing equipment to be used for automation of library services.

Subtotal - Programmatic Needs .... $ 4,100

(2) Maintenance

a. Maintenance/Test Support Building, SNLA .... $ 1,000

This building will permit the consolidation of personnel, facilities, and functions presently fragmented over a wide geographical area in Tech Area III. There are currently about 100 employees located in approximately 25 structures, many of which are temporary. Lack of adequate space has resulted in the conduct of some operations outside, without protection from adverse conditions. This fragmentation creates problems for material, control, protection, and

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-101

9. Purpose, justification of need for, and scope of project (contd.)

security. The existing permanent structures could be used by test operations and various support activities, while the temporary structures would be dismantled.

Subtotal - Maintenance	$ 1,000

(3) Other

a. Area 1 Master Unit Substation, SNLA .... $ 1,000

This substation is required to provide power to new buildings and to relieve overloaded conditions on the existing substations and their feeders.

b. Area 1 Sanitary Sewer East Site, SNLA .... $ 1,000

This project will construct a relief sanitary sewer system for Tech Area 1. The laboratory facility expansion for the last ten years has overtaxed the existing system which is over 30 years old.

Subtotal - Other	$ 2,000

10. Details of cost estimate

a. Engineering, design, and inspection	$29,000
b. Land and land rights	
c. Construction costs	
d. Contingencies	
Total estimated cost	$29,000

11. Method of performance

To the extent feasible, design and inspection will be performed under negotiated lump-sum architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids. In some instances, it will be more economical or timely for design, inspection, procurement, or construction to be done by operating contractors and others already under contract to the Government.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-101

12. Funding schedule of project funding and other related funding requirements

Not applicable.

13. Narrative explanation of total project funding and related funding requirements

Not applicable.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Environmental compliance and cleanup, Lawrence Livermore National Laboratory Livermore, California, and Site 300, California

2. Project No.: 87-D-102

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 3rd Qtr. FY 1987

4. Date construction ends: 3rd Qtr. FY 1991

5. Previous cost estimate: None
Date: N/A

6. Current cost estimate: $134,000 a/
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 7,000	$ 7,000	$ 7,000	$ 7,000
1988	25,000	25,000	25,000	20,000
1989	44,000	44,000	44,000	40,000
1990	40,000	40,000	40,000	44,000
1991	18,000	18,000	18,000	23,000

8. Brief physical description of project

This Lawrence Livermore National Laboratory (LLNL) Environmental Compliance and Cleanup (ECC) project supports a series of investigations, assessment tests, extensive remedial actions, some facility design/construction and environmental quality monitoring and verification, all aimed at cleaning up the site's environment and achieving compliance with various environmental regulations at the LLNL two sites, the Livermore Laboratory Site and Site 300. It is different from a normal facility project and contains extensive nonfacility activity.

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a/ Some of the estimated cost items (such as certain facility design/construction items) have relatively small contingencies and should be close to their actual costs. However, environmental assessments and cleanup operations cannot be accurately estimated and even a large contingency may turn out to be inadequate. The first year FY 1987 has a firm budget of $7,000,000, but the cost uncertainty for the remaining four years increases each year. The total estimated cost of $134,000,000 is a five-year planning estimate. The first year funding will permit completion of the highest priority assessments and begin critical remedial actions. At the end of this period, a better estimate of the remaining effort and cost can be made.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Environmental compliance and cleanup, Lawrence Livermore National Laboratory Livermore, California, and Site 300, California	2. Project No.: 87-D-102

8. Brief physical description of project (contd.)

There are four major tasks in which work will be performed by this project. They are:

a. Investigative/Assessment
b. Facilities Design and Construction
c. Environmental Corrections, Cleanup and Abatement
d. Monitoring

These tasks will be applied to seven distinct activities in which LLNL is either in violation of or must act to prevent the contamination of the environment. These activities are:

1. Underground and Surface Water
2. Soil Contamination
3. Landfills
4. Liquid Waste Discharges
5. Underground Tanks
6. PCB Filled Electrical Equipment
7. Reactor Decommissioning

Several contamination assessments, and control or remediation efforts are under evaluation at the present time at LLNL to satisfy existing urgent requirements. These activities will be used to determine some of the future remedial action to be implemented under this project. For those tasks in this project, where the nature and extent of the contamination is well enough understood to determine the corrective steps, this project provides not only for the completion of the assessment but also for the required cleanup or remedial actions. This project also provides for further assessment of those areas which have not yet been adequately defined and others which have the potential for, but less probability of, contaminating the environment.

The laboratory must pursue this project under the watchful purview of a large number of Federal, state, and local environmental regulatory agencies. To satisfy the demands of the regulators, this project must address and balance the requirements both to cleanup vigorously existing contamination and to assess energetically sites of potential contamination.

The degree of remedial action required to comply (for some of the segments of this project) is dependent on data from assessments currently underway (or planned for FY 1985 and 1986), as well as on newly enacted legislation for which implementing regulations are still being developed (e.g., underground tanks).

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental compliance and cleanup,
Lawrence Livermore National Laboratory
Livermore, California, and Site 300, California

2. Project No.: 87-D-102

8. Brief physical description of project (contd.)

a. Investigation/Assessment

The first task to be accomplished on each of the seven areas of contamination is to determine accurately the extent of contamination.

(1) Underground and Surface Waters.

The most urgent priority will be given to complete the environmental assessments that have already been initiated and start on the cleanup of areas known to be contaminated; they are a gasoline spill at the Livermore Site, the aquifer in areas adjacent to the Lawrence Livermore and Sandia Livermore Sites, and an area at Lawrence Livermore Site 300. Significant trichloroethylene (TCE) contamination has been identified in the ground water underneath the Livermore Site and also underneath adjacent properties. The source of this contamination is currently under investigation. It was this contamination that lead the Environmental Protection Agency (EPA) to nominate the Laboratory for the National Priority List of Contaminated Sites that need urgent correction. Continuing assessments will include drilling diagnostic wells to determine the location, concentration, migration, and types of contamination through sample analysis and geological analyses. There are at least four additional locations which are strongly suspected to have contaminated aquifers. When the urgent priority sites have been assessed, these will be investigated. As a part of this initial work, a feasibility study will be undertaken to evaluate several alternate options for cleaning of the underground water at the Livermore Site, including a possible central water treatment facility for cleaning waters extracted from several areas.

(2) Soil Contamination

The sources of soil contamination date back more than four decades, when the present Laboratory Site was a Naval air base. The principal objective of this activity will be to assess and cleanup all areas of known and suspected soil contamination by deposition of hazardous waste on the land surface. This includes liquid spill sites, particulate solid deposits, former suspected slurry ponds or inactive, undiscovered former landfills.

There are two tasks: The first concerns the completion of the assessments of two locations (most of which already have been started) that are strongly suspected to have contaminated soils. Sampling will be done to identify and quantify the contaminants. The second task concerns the assessment of a number of additional locations that may have soil contamination; however, these locations have not been sampled or as yet assessed. A historical site survey has identified about 24 such locations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Environmental compliance and cleanup, Lawrence Livermore National Laboratory Livermore, California, and Site 300, California	2. Project No.: 87-D-102

6. Brief physical description of project (contd.)

(3) Landfills

For the past 30 years, hazardous materials have been placed into landfills at Site 300. Two of these are active landfills and seven of them are inactive. Eight of these landfills have ground water monitoring wells which have been sampled over the past three years. These wells were installed to meet Federal Resource Conservation and Recovery Act (RCRA) ground water monitoring requirements. This has helped the Laboratory identify potential ground water contamination problems and provided the basis for defining the tasks to be done in FY 1987 and beyond. Laboratory records show that at least some of these landfills contain hazardous materials which must be cleaned up. The monitoring wells have already detected traces of contaminants such as tritium, TCE, organic solvents, and heavy metals. The records for one of the landfills show that over 2,000 capacitors containing polychlorinated biphenols (PCBs) are buried there.

(4) Liquid Waste Discharges

The objective of this work is to prevent the potential accidental or uncontrolled release of toxic and radioactive pollutants to the local ground water and to the City of Livermore sewage treatment plant.

(5) Underground Tanks

The principal objective is to remedy any leaks of toxic fluids in underground tanks, sumps, and related underground piping systems and to remove any soil where prior leaks have caused unacceptable contamination. There are about 110 known underground tanks or sumps at the Livermore Site and about 25 underground tanks at Site 300. There are an unknown, but probably small, additional number of such tanks that have been filled up, removed or abandoned that could have leaked. Only a portion of these tanks contain or previously contained "regulated" fluids; for example, gasoline, plating shop wastes, diesel oil, or contaminated rinse water. During FY 1985, a program was initiated to leak test all tanks with potentially hazardous liquid contents (current and past) using a certified test technique. If it is determined that a substantial toxic liquid leak had occurred, then an assessment will be made to determine the levels and extent of the contamination in the adjacent soil regions or underground waters. If this assessment shows unacceptable contamination, then the soil and/or local ground water may need to be recovered, cleaned up, removed and/or reconditioned. The amount of effort needed for the cleanup will depend upon an assessment of the local situation for each tank.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Environmental compliance and cleanup, Lawrence Livermore National Laboratory Livermore, California, and Site 300, California	2. Project No.: 87-D-102

8. Brief physical description of project (contd.)

(6) PCB in Electrical Equipment

The objective of this activity is to reassess and remedy known and potential contamination of PCB in specific LLNL electrical equipment and to prevent and avoid the potential consequences of a fire of PCB containing equipment. A survey was performed by LLNL of PCB containing electrical equipment (transformers, capacitors, inductors, etc.) in 1980 and 1981. Over 8,000 equipment items were evaluated. Many had samples taken and analyzed to determine the PCB content in the dielectric fluid and those found to contain PCB were labelled with a warning sign if above 500 ppm. The small capacitors (less than 3.0 pounds of dielectric fluid) are specifically exempted and need not be controlled and were not sampled or analyzed. A number of larger transformers with PCB content in excess of 500 ppm were identified in the Laboratory's power distribution system, and they should be replaced. A reassessment will be made and the 1980/1981 PCB survey will be updated; certain equipment used in experimental programs will be included. Additional laboratory analysis of dielectric fluids will be made. The result will be a list of equipment that requires remedial actions (such as spill containment, remove equipment, displace PCB, replace equipment, add fire protection, etc.).

(7) Reactor Decommissioning

A Decommissioning Plan for the pool reactor was required by Department of Energy prior to the reactor shutdown. A plan was prepared and submitted in September 1979. That plan stated the decommissioning would be concluded after a five year cool-down period. There is no investigation required to define what remedial action must be accomplished.

b. Facilities Design and Construction

As the investigation and assessment effort begins to identify the extent and parameters of specific sites of contamination, remedial actions must begin to correct the problems. This effort must start at the first sites investigated even as new, additional sites are being looked at. In some instances, particularly the contaminants which have already been identified and analyzed, corrective actions can begin almost immediately. Some of these require the design, construction, and operation of structures to treat the contamination.

(1) Underground and Surface Waters

The treatment will require the sinking of recovery wells to pump water to a treatment plant. Depending on the type of contaminant, the treatment will include air stripping, activated carbon absorption, clarification, oxidation/reduction or possibly other processes. Treatment plants will be designed and constructed at the Livermore Site and at Site 300. The environmental assessment work planned for FY 1985 and FY 1986 should permit an early 1987 start on the first

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental compliance and cleanup, Lawrence Livermore National Laboratory Livermore, California, and Site 300, California

2. Project No.: 87-D-102

8. Brief physical description of project (contd.)

treatment system, a low-flow pilot treatment system. Thereafter, two or more treatment plants will have to be designed and built before full-scale underground water cleaning treatments can commence. Based on water data available to date, one treatment plant is required for Site 300 and three plants for the Livermore Site.

The design of the treatment plant must provide for the adequate removal of the contaminants and the recovery of hazardous products where these are significant. The extent, complexity, and therefore the cost of treatment depends critically on the type and concentration of the contaminated species. For highly volatile organic toxic materials in small concentrations, a simple air stripping system should be adequate. For other organic compounds and higher percentages, additional removal processes such as absorption by highly activated carbon columns is needed. For dissolved metallic species (e.g., chromium, copper, nickel, etc.) an ion exchange process is needed and some other impurities will require a reverse osmosis process.

(2) Soil Contamination

There are currently no structures identified which must be designed and built to remedy soil contamination. Corrective action to be taken is described in paragraph 8.c(2) below.

(3) Landfills

To reduce the waste volume placed in the landfill and to decontaminate actively some of the wastes requires the designing, constructing, activating, obtaining a permit, and demonstrating a hazardous waste incinerator system to be located at Site 300. The system will thermally decompose hazardous wastes, such as PCB contaminated capacitors, organically contaminated soils, hazardous organic solvents, and reduce the volume of firing table debris. The incinerator will have a size reduction capability (for cutting up metal scrap, barrels, transformers, etc.) an afterburner, a scrubber, a dewatering system for concentrating the solids in the scrubber liquid, and other auxiliaries. It will be necessary to demonstrate the capability to destroy and/or remove 99.999 percent of typical difficult wastes (such as PCB) before an operating permit can be obtained.

For materials containing highly toxic organic compounds (e.g., Phenols, PCB, etc.), it has been shown that it is cost effective to use thermal destruction (at furnace temperatures of 2100 to 2200 degrees F) rather than the alternative of hauling to an approved hazardous waste landsite when large quantities of soil or materials are involved.

The incinerator will continue to operate as part of the Laboratory waste management effort after FY 1991 when work under this project will have been completed.

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1. Title and location of project: Environmental compliance and cleanup,
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8. Brief physical description of project (contd.)

(4) Liquid Waste Discharge

There are currently no structures identified which must be designed and built to treat liquid waste discharge contamination. The remedial action to be taken is described in paragraph 8.c(4) below.

(5) Underground Tanks

Remedial action of either removal, replacement, or upgrade will be required for those tanks that were identified to have leaked or are leaking. Depending on local conditions, the upgrading will be either a second shell (tank within a sump), a replacement with an above ground tank or pipes, or a new underground tank that conforms to newly enacted state legislation.

(6) PCB in Electrical Equipment

There are currently no structures identified to be designed and built soley to address this problem. The incinerator described in paragraph 8.b(3) above, however, will provide an appropriate level of treatment to remedy the situation.

(7) Reactor Decommissioning

There are currently no structures identified that must be designed and built to assist in the decommissioning of the reactor.

c. Environmental Corrections, Cleanup, and Abatement

At the same time that design and construction of facilities begins to address some of the cleanup requirements, extensive, non-facility activity must commence to address other problem areas. As with the structures, work of this type must also commence as the extent and parameters of the contamination at a particular site becomes known. Here again, corrective actions at some sites will begin while investigation and assessment continues at others.

(1) Underground and Surface Waters

With existing assessment techniques, it is difficult to estimate accurately the cleanup effort required because the exact configuration of the contaminated plume is not usually accurately predicted and actual contamination levels of pumped ground water may differ from those that were initially sampled. It may require tens of years of pumping and treatment to remedy properly the contamination in any of the several underground waters. Therefore, many of these

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental compliance and cleanup,
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8. Brief physical description of project (contd.)

pumps and treatment plants will continue to operate after FY 1991, when work under this project will have been completed. The operating costs (number of personnel, electric power, chemical additives, maintenance, etc.) can vary significantly depending on the complexity and size of the treatment system.

To eliminate contamination of surface waters will require containment of the surface water runoff over a major portion of the Livermore Site. Containment of the runoff will be achieved through lining existing drainage channels and the lining of a water impoundment basin where surface water can be monitored and, if necessary, treated before discharge.

(2) Soil Contamination

If, as expected, the assessment of soil contamination shows excessive levels, then it will be followed by a cleanup operation. It could be the hauling of the soil to approved hazardous waste sites or possibly the destruction of toxic organic species in the soil by heat through the hazardous waste incinerator described in paragraph 8.b(3) above. The exact method of treatment will depend on the contamination parameters found in the assessment. There is a large uncertainty in these costs depending on the nature of the soil and the local geology. Often the full cost is not known until the contaminated soil has been largely removed and no further contaminated pockets have been identified. Best estimates based on initial assessments and experience were used.

Soil pollution is often accompanied by ground water pollution. Although all these locations are likely to encounter primarily soil pollution, they may have pollutants that seeped into the ground water, also requiring some ground water withdrawal and treatment.

(3) Landfills

When possible and prudent, some of the existing landfills, both active and closed, will require final impervious covers and barrier protection against lateral movement of contaminants. A new landfill needs to be designed and permits obtained to accommodate materials removed from old sites, contaminated soils, and future generated wastes.

(4) Liquid Discharges

To prevent toxic or radioactive discharges to the City of Livermore sewage treatment plant will require remedial efforts in four areas:

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1. Title and location of project: Environmental compliance and cleanup, Lawrence Livermore National Laboratory Livermore, California, and Site 300, California

2. Project No.: 87-D-102

8. Brief physical description of project (contd.)

(a) Spill Containment for Above Ground Liquid Waste or Products

Positive secondary containment will be provided for a series of above ground tanks and parked tank trucks containing toxic chemicals, road oils, or fuels. In most cases, positive secondary containment will be provided by bermed concrete pads lined with an inert epoxy coating.

(b) Correction of Noncompliant Industrial Wastewater Discharges

Several storm drain connections will be disconnected and reconnected directly to the sanitary sewer system. There are currently four known locations where backwash fluids are discharged into the storm sewers; they are the backwashing systems for the LLNL swimming pool, the Low Conductivity Water (LCW) system, and the upgrading of two washdown systems for cooling towers. Due to operating constraints, the four backwash systems must be discharged during peak sewer use periods, when sewage flows are too high for the already over-extended sanitary sewer system. Therefore, onsite containment of backwash effluent is to be provided with controlled extended-time discharge to the sewer.

(c) Sewer Diversion/Retention System

An emergency diversion system will be provided for potential uncontrolled, unscheduled, or accidental releases of toxic and radioactive materials entering the sanitary sewer system. The system will consist of a basin and limited pretreatment equipment to retain and treat accidental or unauthorized spills prior to discharging into the City of Livermore's sewage treatment system. If the contamination is within permissible limits, the diverted sewage would be released slowly into the city sewer without treatment. Diversion of sewage would be initiated by a series of monitoring instruments. The diversion basin will be sized to contain an eight-hour spill occurrence period as well as one feet of precipitation in the basin. Based on past monitoring records, this should provide sufficient detention time to contain all potential process spills and would at the same time allow for some possible chemical treatment and aeration for cases where the contamination is above allowable limits.

(d) Rehabilitation of Existing Sewer System

The existing sanitary sewer system will be rehabilitated. The work is aimed at reducing the infiltration of rainwater into the sanitary sewers during the wet period and the infiltration of sewage into the soil and ground water during the dry season. The initial effort will be an infiltration and inflow study to understand the flow distribution and likely major leak locations. The rehabilitation of the sewer will include pressure grouting of open joints, slip lining of cracked or damaged sewer pipe, and replacement of some segments.

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1. Title and location of project: Environmental compliance and cleanup,
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2. Project No.: [illegible]

8. Brief physical description of project (contd.)

(5) Underground Tanks

To correct the problems identified during the assessment will require the removal and replacement or upgrade of those tanks or pipes that were identified to have leaked or are leaking and that were not previously remedied. Depending on local conditions, the upgrading will be either a second shell (tank within a sump), a replacement with an above ground tank or pipes, or a new underground tank that conforms to the new regulations.

For tanks or sumps with hazardous contents, means are to be provided for detecting leaks. This could be a simple procedure for periodic monitoring or alternately some diagnostic instruments (with or without automatic alarms) for indicating a leak.

(6) PCB in Electrical Equipment

Any electrical equipment identified in the reassessment (paragraph 8.a(6) above) as containing PCB will be removed, disposed of, and replaced by new equipment. This will include both transformers and capacitors.

(7) Reactor Decommissioning

The work to be accomplished is divided into five tasks. During Task 1, preparations will be made for the removal and demolition operations. This will include placing containment building support and safety facilities in operation, installing temporary facilities (change room, decontamination area, etc.), and removing unneeded equipment. Task 2 will cover removal of radioactive material from the thermal columns and reactor pool tank. The demolition of the reinforced concrete reactor shield structure, Task 3, will be done by an experienced subcontractor. Task 4 concerns the removal and disposal of ancillary facilities. Task 5 will recondition the building for reuse by replacing the floor area.

9. Monitoring

Before, during, and after all work to be accomplished in this project, efforts will be made to monitor existing conditions. These monitoring efforts are essential for the understanding of initial conditions, spilling or exposing contamination during work, and followup assessment of the work that will be accomplished.

The FY 1987 funding is currently planned to initiate investigation/assessment activities for items (1) through (5), and to initiate design and remedial activities for items (1), (2), and (5). However, pressures from regulatory authorities could result in a reprioritization of emphasis of assessment and remediation efforts.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Environmental compliance and cleanup, Lawrence Livermore National Laboratory Livermore, California, and Site 300, California	2. Project No.: 87-D-102

6. Purpose, justification of need for, scope of project

The principal justification for the ECC project is to upgrade or correct a series of environmental local contaminated areas/equipment/facilities and to comply with Executive Order 12088 (which causes Federal facilities to comply with all applicable Federal, state and local pollution control requirements). In the past, LLNL operated a number of facilities in manners that are no longer considered environmentally acceptable. As is the case with most old facilities, they were built and operated to environmental standards that no longer conform to the new laws. As already mentioned in the prior section (Description of Project), [illegible] contamination of unknown origin in ground waters beneath the Laboratory and areas adjacent to the Laboratory have lead to being nominated by the EPA for the National Priority List for contaminated sites. Past operations on the laboratory property, including surface discharges, and burial of toxic materials at Site 300, including PCB containing electrical equipment in closed landfills, have also created conditions that are not now consistent with new laws. These and other problems must be corrected. Separate discussion of each of the contamination types is contained in paragraph 6a(1) through (7) below.

This ECC project is a multiyear line item for identifying, assessing, and remediating or cleaning up to correct Laboratory environmental contamination or threat of contamination. The project covers a group of one-time assessments and one-time corrections of unacceptable local environmental conditions. The goal of the project is to correct problems created by past operations or practices, bring the Laboratory into compliance with applicable laws and regulations, or, where prudent practice dictates, achieve a greater degree of correction. The long term goal is a Laboratory that is environmentally a safe place and that poses no harm to the local environment or community.

As a Federal facility, LLNL is required to comply with Federal laws, DOE Orders, and the increasingly stringent state and local equivalents of Federal laws and regulations which are being implemented and enforced by state, county and local regulatory agencies. Most of the interactions in this project will be with these local agencies: the Regional Water Quality Control Board, the California State Department of Health Services, the Bay Area Air Quality Management District, the San Joaquin County Air Pollution Control District, and the regional office of the EPA. New laws, new regulations, and permit requirements are being created at an ever-increasing rate. In 1984, for example, the State of California enacted 40 new bills concerned with environmental issues. The priorities and timing requests for funds are based on a best effort estimate of the health, expected regulatory agency actions, and total costs.

Pressures from regulatory agencies have been very high and major unplanned expenditures have already had to be made to satisfy their requirements. The potential consequences of not supporting this ECC project are as follows:

a. LLNL could be out of compliance with several regulations and thus not conform to Federal and/or state laws.

b. Compliance orders can cause the shutdown of shop operations, major experiments, or laboratories where toxic materials are not adequately controlled and are released to the environment. This in turn can cause significant delays and extra costs

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1. Title and location of project: Environmental compliance and cleanup,
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9. Purpose, justification of need for, scope of project (contd.)

to Laboratory programs. Recent interactions with the California Regional Water Quality Control Board have, for example, almost resulted in shutting down our high-explosive (HE) processing operation which would have caused a major disturbance and setback in weapons testing.

c. Additional unplanned mandated emergency cleanup operations will be required, and they will divert large amounts of program funds intended for other purposes.

d. Failure to correct will create unfavorable publicity (local and national) for the Laboratory, University, DOE, and the U.S. Government, and potential rallying causes for environmental and anti-nuclear activists.

e. Regulatory agencies can impose substantial fines, such as $25,000 per day, per violation and in some cases local agencies can imprison or hold personally liable managers and/or employees who knowingly allowed environmental contamination to continue.

f. A further delay can increase the potential for additional lawsuits by parties who believe that they were damaged. Several lawsuits are currently pending; those costs potential cannot be identified.

(1) Underground and Surface Water Assessment and Cleanup

This work will allow cleanup of contaminated ground water and control of sources which could potentially contaminate ground water. The protection of ground water resources is regulated by the California State Water Quality Resources Board and its Regional Water Quality Control Board. They have a non-degradation policy which prohibits activities which would impair beneficial uses of water which, in most cases, requires meeting drinking water standards, state action levels for drinking water, or in the absence of criteria and standards, relevant data on health effects and potable use. The Board requires ground water cleanup to a level that maintains beneficial uses plus soil cleanup to prevent contamination from entering uncontaminated ground water. Cleanup plans are to be adopted by way of an issuance of Waste Discharge Requirements, which is a State Regional Water Quality Control Board discharge permit.

The State Water Code provides for the assessment of civil monetary penalties for various circumstances of illegal discharge. The Board decides whether it wishes to pursue monetary penalties for each individual ground water contamination case. Historically, enforcement actions have not been taken if there has been a reasonable effort to prevent and/or detect the discharge of contaminants, cooperation in detection and reporting the contamination, prompt abatement of the discharge and pursual of a prompt and effective cleanup, and the discharge will not result in a long-term impairment of beneficial uses of waters. If enforcement actions are taken, the Water Code allows fines up

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9. Purpose, justification of need for, scope of project (contd.)

to $5,000 per day for most illegal discharges and for hazardous wastes, penalties up to $25,000 per day may be applicable. Penalties are based on the number of days that the discharge occurred.

The Laboratory was recently nominated for the National Priorities List because of the ground water contamination in the area. The local communities surrounding the Laboratory draw a portion of their water from wells. There is concern and public pressure to remove the contamination from the underground water. Because large public water supplies and small private wells are located downgradient from the Livermore Site and because the public is demanding action on ground water contamination cases in the State, prompt action is being required of LLNL by State agencies.

The surface drainage system and the impoundment located at the center of the Livermore Site have been identified as likely pathways for ground water contamination if a hazardous substance is inadvertently released. Both of these need to be corrected.

(2) Soil Contamination Assessment and Cleanup

This work will allow assessment and cleanup of sites where soil contamination may have occurred as a result of practices that were acceptable in the past. The concern has been that the contaminants in the soil can spread into the ground water. Two areas, the photolab rinsewater discharges sites and HE lagoon sites, are being closed pursuant to State Water Code requirements.

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The protection of ground water resources is regulated by the State's Regional Water Quality Control Board. They have a non-degradation policy which prohibits activities which would impair beneficial uses of water. The Board requires action to ensure that contamination will not enter uncontaminated ground water. This is regulated through issuance of Waste Discharge Requirements, which is a State Regional Water Control Board discharge permit.

The State Water Code provides for civil monetary penalties. Fines of up to $6,000 per day for unpermitted discharges and up to $25,000 per day for hazardous waste discharges can be applied.

(3) Landfills Assessment and Cleanup

This work will allow for management of buried hazardous wastes, prevention of environmental contamination associated with leaky landfills, and disposal of potential PCB landfill contamination. Currently, all of the landfills need to be upgraded to meet State of California Title 23 Subchapter 15 specifications for landfills, and, in the case of the landfill complex where traces of tritium and TCE are being detected, an upgraded monitoring program must be designed and implemented and remedies such as barriers installed to meet EPA Resource Conservation and Recovery Act

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9. Purpose, justification of need for, scope of project (contd.)

requirements. The two active landfills need to be upgraded to meet State Department of Health Services Interim Status Permit requirements for landfill covers and all landfills need to be upgraded to meet State Regional Water Quality Control Board Waste Discharge Requirements for landfill covers.

Both State agencies have sent LLNL letters of deficiency citing the improper landfill covers. To achieve compliance with the agencies listed above and to improve environmental protection, landfill contents must be protected in a way to preclude migration of contaminants from the facility. To prevent future problems, PCB contaminated wastes should be removed and thermally destroyed or disposed of properly in a landfill that meets regulatory specifications.

Failure to understand and address contaminant movement could lead to a regulatory staff position that the Laboratory is ineffectively addressing actions to mitigate problems. The State Water Code, as administered by the Regional Water Quality Control Board, allows fines up to $6,000 per day for illegal discharges and, for hazardous wastes, penalties of up to $25,000 per day can be applied. If an active landfill does not meet hazardous waste requirements, LLNL's hazardous waste operating permit can be suspended, with possible penalties of up to $25,000 per day imposed for noncompliance and major delays and extra cost to program operations.

Because there is a potential for ground water contamination from leaching of hazardous wastes from the landfills by rain water, it is important to upgrade the containment structure of the landfills. Since contamination has started to appear in ground waters downgradient of several landfills and because the Laboratory has been in noncompliance with cover requirements for over five years, this effort should be started in FY 1987. It is unlikely that an extended schedule would be allowed by the regulatory agencies beyond this time.

(4) Liquid Waste Discharge and Compliance

In the current regulatory climate, it is prudent practice to place berms and other methods of spill containment around many aboveground tanks and parking areas for tanker trailers/trucks that store toxic liquids, chemicals, and diesel fuels. A number of these areas need to have such containments designed and built. The LCW system, swimming pool, and cooling towers discharge industrial waste water indirectly to the ground water. Radioactivity, heavy metals, and low pH anomalies are monitored on occasion in the sanitary sewage, but no means of containing detected uncontrolled spills exists. The City of Livermore sewage treatment plant, which processes the LLNL effluent, is at risk from an accidental toxic, organic, or radioactive spill into the sewer system. Such a major spill can cause the City plant to become inoperative and unable to treat sewage. A non-complying unlined earthen pond now exists for by-pass emergency storage when repair work is required to be done on the monitoring station.

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The Federal Clean Water Act (CWA) and the State of California Porter-Cologne Act, administered by the California State and its Regional Water Quality Control Boards, prohibits discharge of hazardous waste and most industrial waste waters to the ground and, in effect, have established a non-degradation policy for ground water resources. Failure to comply with the discharge requirements could result in fines of up to $6,000 per day for waste water discharges and up to $25,000 per day for hazardous waste discharges.

The City of Livermore sewer ordinance contains provisions for the protection of their sewage treatment plant and for the sewage plant's ability to meet state discharge requirements. The ordinance describes the nature and type of pollutants and waste water generally prohibited from direct treatment and that require pre-treatment by users prior to disposal. The ordinance specifically lists the discharge limits for pollutants that are likely to appear in the LLNL sewage effluent if an accidental or unauthorized release occurs. The ordinance provides for the protection of the treatment plant from accidental discharge of prohibited materials and substances by requiring the user to construct, operate, and maintain detection, retention, and pre-treatment facilities.

Any violation or nonconformance with the ordinance may invoke revocation of the LLNL permit to discharge. LLNL is also liable to the City for any expense, loss, or damage occasioned by the city by reason of violation; an incident that costs up to $2,000,000 per occurrence is possible.

The consequences of deferring this effort could be extremely costly emergency cleanups as well as fines in the event of an accidental spill and/or contamination. Such an accident could prompt a "shut down" of LLNL by local, state, or Federal authorities, and a requirement for the immediate construction of their imposed remedies which may include all or part of the described subproject tasks.

The existing sewer system is suspected to have leaks that contribute sewage to the underground water. A rework to seal the leaks is needed to minimize this potential contamination and to minimize fluctuations in sewer flow due to rainwater.

(5) Underground Tank and Pipes, Assessment Remedies and Cleanup

The control and upgrading of LLNL underground tanks and pipes is regulated by the State of California Water Resources Control Board and its Regional Water Quality Control Boards and local county ordinances. The agencies require submission of a tank inventory and testing of underground tanks for leaks according to a certified test procedure and monitoring for future leaks. If soil or ground water are found to be contaminated by leaks, then this falls under the regulation and penalties listed in items 9.(1) and 9.(2) above. There are provisions for reporting leaks to the

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9. Purpose, justification of need for, scope of project (contd.)

Department of Health Services and the Regional Water Quality Control Board. A new State law governs monitoring and compliance, and its regulation is allocated to the responsible local county or city.

Penalties for noncompliance with the tank inventory submittal requirements include fines of $500 to $5,000 per day for each day the submittal has not been received and $2,000 to $20,000 per day for each day false information submitted goes uncorrected. The penalties for failing to take actions concerning permitting, monitoring, maintaining records, compliance, and closure of an underground storage tank include fines of $500 to $5,000. If records are falsified or unauthorized releases are not reported, fines of from $5,000 to $10,000 or imprisonment in the county jail for up to one year, or both, can be imposed.

The mandated timing deadlines required for accomplishing the work are: (1) completion of testing by July 1, 1985; and (2) implementation of leak detection and subsurface monitoring systems by July 31, 1988. Schedules for action on leaking tanks are mandated on a case-by-case basis, as determined by State Water Quality Control Board and Department of Health Services policies described in 9.(1) and 9.(2) above. Additional regulations on underground tanks are currently being formulated by State agencies.

(6) PCB in Electrical Equipment, Reassessment, Disposal, and Displacement

The principal justification for performing this work is to avoid PCB contamination resulting from a fire and to minimize the consequences of a major leak into the ground because such events would require a very expensive cleanup operation. Such a clean-up effort has cost between $3 and $16 million per incident in actual occurrences in other establishments.

If PCB liquid is spilled onto the soil, then there are severe regulatory requirements (and penalties) in California for cleanup to less than five parts per million in the soil.

(7) Nuclear Reactor Decommissioning

A Decommissioning Plan for the pool reactor was required by DOE prior to the reactor shutdown. A plan was prepared and submitted in September 1979. That plan stated that the decommissioning would be concluded after a five year cool-down period. It is now proposed to complete this project in the FY 1989-1990 timeframe. Continued deferral will result in larger eventual costs and cause us to be out of compliance with the plan. Removal of the reactor, including the external structure, radioactive shielding, internal components, and equipment, will dispose of a substantial amount of radiation waste. In addition, it will permit unrestricted use of the 250,000 cubic feet building with excellent high-bay space. The cost of an equivalent new building would be higher than the cleanup costs.

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6. Details of cost estimate a/

		Item cost	Total cost
a.	Engineering, Design, & Inspection		[illegible]
	(1) Related to facilities	[illegible]	
	(2) Assessments, Investigations, & Monitoring	[illegible]	
b.	Construction Costs		[illegible]
	(1) Improvements to land, including grading, paving, roads, parking, fences, and landscaping	[illegible]	
	(2) Facility construction		
	(a) [illegible]	[illegible]	
	(b) [illegible]	[illegible]	
	(c) Other construction	[illegible]	
	(3) Utilities, [illegible]	[illegible]	
c.	Removal and disposal of contaminated materials, equipment and cleanup		[illegible]
	Subtotal		[illegible]
d.	Contingency at approximately [illegible] percent of above costs		[illegible]
	Total project cost		[illegible]

Cost Uncertainty and Contingency

[illegible]

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a/ [illegible]

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6. Details of cost estimate (cont.)

Treatment is changing very rapidly and this will affect the costs. Also, the state-of-the-art of health science is changing. This will affect the understanding of health effects and, in turn, the permissible levels of toxic materials in water, air, or soil.

In addition, there are uncertainties in how quickly and how effectively local regulatory authorities will enforce the existing environmental laws and regulations. It is also essentially impossible to anticipate how many new laws, rules, and regulations will become requirements for the Laboratory in the years before this project is completed ([illegible]). The public pressure for cleaning up the environment has caused a flurry of new laws and requirements that are being created (or will be created) by the legislature and local regulatory bodies.

Some of the estimated cost items (such as certain facility/construction items) have relatively small contingencies and should be close to their actual costs. However, environmental assessments and cleanup operations cannot be accurately estimated and even a large contingency may turn out to be inadequate. The first year FY [illegible] has a firm budget of $[illegible], but the cost uncertainty for the remaining [illegible] years increases each year. This first year will permit completion of the highest priority assessment and begin remedial actions. At the end of this period, a better estimate of the remaining effort and cost can be made.

7. Method of performance

(a) Assessments will be largely performed by LLNL personnel and include sample collection, analysis, and evaluation. Several contracts will be subcontracted to Environmental Engineering or Professional Consulting firms on a negotiated basis. Well drillings will be accomplished, where feasible, on a negotiated fixed price basis after competitive bidding.

(b) Equipment Procurement will be on a fixed price basis after competitive bids, whenever possible. Installation will be by equipment vendor or facility construction contractor, where feasible, otherwise by in-house personnel.

(c) Design of major facilities (e.g., the [illegible] system) will be on a negotiated architect engineer contract. Minor items will be designed in-house.

(d) Construction of a major facility will be on a fixed price basis after competitive bidding. Minor facility construction can be by in-house capital contractor or in-house craft personnel.

(e) Cleanup and Contamination Movement Operations will be, where possible, on a negotiated basis after competitive bidding, with provision for [illegible].

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12. Funding schedule of project funding and related items

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	Total
a. Total Project Funding							
(1) Total Facility Cost							
(a) Construction line item	$ 0	$ 7,000	$ 20,000	$ 40,000	$ 44,000	$ 23,000	$134,000
Total Facility Costs	$ 0	$ 7,000	$ 20,000	$ 40,000	$ 44,000	$ 23,000	$134,000
(2) Other Project Funding							
(a) Conceputal design costs	130	0	0	0	0	0	130
(b) Other Project Related Costs	8,190	0	0	0	0	0	8,190
Total Other Project Funding	8,320	0	0	0	0	0	8,320
Total project funding (items 1 and 2)	$ 8,320	$ 7,000	$ 20,000	$ 40,000	$ 44,000	$ 23,000	$142,320

b. Total Related Funding Requirements	
(1) Facility operating costs per year beginning FY 1992	$ 5,000
Total Other Related Funding Requirements	$ 5,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total Project Funding

(1) Other Project Funding

(a) Total funding in this classification represents the conceptual design cost. Changing technologies may require additional effort not currently foreseen.

(b) Other Project Related Cost - Prior environmental assessments directly related to the project ($3,230,000), GPP construction and other similar construction ($1,770,000), and landfill cleanup operations ($3,190,000), all between FY 1984 and FY 1986; total is $8,190,000.

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13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Other Related Funding Requirements
(1) Facility Operating Costs

Operating costs of the new facilities for utilities, supplies and personnel are estimated to be about $5,000,000 per year beginning in FY 1992. They are based on consultants' estimates, but will depend on the facility designs. Additional support personnel will be needed.

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FY 1987 CONGRESSIONAL BUDGET REQUEST
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Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars.)

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2. Project No.: 87-D-104

3. Date A-E initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 1st Qtr. FY 1988

4. Date construction ends: 4th Qtr. FY 1990

5. Previous cost estimate: None
Date:

6. Current cost estimate: $67,400
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 4,300	$ 4,300	$ 4,300	$ 2,900
1988	26,200	26,200	26,200	15,500
1989	33,200	33,200	33,200	29,500
1990	3,700	3,700	3,700	19,500

8. Brief physical description of project

This project at the Lawrence Livermore National Laboratory (LLNL) will provide two physical protection systems: (a) "Super Block," and (b) "Buffer Security System."

a. Super Block

The physical protection system for the Super Block is designed to conform to protection requirements for Categories I and II quantities of special nuclear materials (SNM) and associated vital equipment. Within the Super Block will be sited the Tritium Facility, the Plutonium Facility, a Laser Isotope Separation Facility, and the Engineering Test Building.

(1) Protected Area

The Super Block is surrounded by a vehicle barrier and a pedestrian delay fence, delineating an isolation zone containing an intrusion detection system. Intrusion detection includes redundant and diverse alarms and assessment. Separate portals provide vehicle/pedestrian access allowing control and searches into and out of the protected area.

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8. Brief physical description of project (contd)

(a) The intrusion detection system for the isolation zone consists of alarm sensors, closed-circuit television (CCTV), and protective lighting. The alarm sensors will be triple redundant and diverse. The alarms are located in discrete detection areas, and each area will be assessed by a fixed CCTV camera. Each alarmed area will have sufficient lighting to aid in CCTV or protective service officer assessment.

(b) Four hardened and elevated guard positions are provided to allow clear lines of sight along all four sides of the isolation zone, building rooftops, and spaces between the buildings. Two of these positions are integrated with rooftops of existing buildings, one will be integrated into the Office Building (trailer replacement) (item a(4)) in this proposal, and the fourth will be integrated with the northeast vehicle portal.

(c) The Protected Area will have three portals for access control of personnel and vehicles. The portals will be equipped with contraband sensors for detection of SNM and metallic objects. The portals will be hardened.

(2) Modifications to Material Access Area/Vital Area

Modifications will be made to existing buildings within the Protected Area. These modifications provide uniform detection and delay for the physical protection of the facilities within the buildings. Intrusion detection systems will be installed, including alarms and assessment. Portals for pedestrian access control and exit searches are provided. Fixed barriers will be used to provide uniform perimeter delay. Access denial systems will be installed in selected locations.

(a) Each facility in the Super Block requiring a Material Access Area or Vital Area will be equipped with redundant and diverse alarms and CCTV for assessment. The alarms will sense penetration of perimeters and selected rooms. Currently deployed alarm systems will be upgraded to conform with present security guidelines. The perimeters will be uniformly hardened by the use of fixed barriers consisting of walls or doors.

(b) New portals will be installed in those facilities having SNM or vital equipment. The portals will be controlled to limit entry to appropriately cleared individuals. At Material Access Areas, SNM detectors will be used in conjunction with exit searches. The portals will be hardened for protection of security personnel.

(3) Additions to Consolidate SNM Vaults, Radiographic Facilities, and Provide Secondary Alarm Station

Categories I and II quantities of SNM are presently stored and radiographed in facilities both inside and outside the Super Block. New facilities will be constructed as an addition to the Plutonium Facility to consolidate these functions inside the Super Block.

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1. Title and location of project:	Safeguards and security enhancements II, Lawrence Livermore National Laboratory, Livermore, California	2. Project No.: 87-D-130

6. Brief physical description of project (cont'd)

(a) Vault

As a major component of the Laboratory's plan to improve its safeguards and security posture, the addition includes a vault designed to accommodate all of the Laboratory's Categories I and II SNM inventory. This vault will serve as the central point for receiving, shipping, storage, and distribution for all SNM at LLNL.

(b) High Resolution Radiography Laboratory

A high resolution radiography capability is required to image assemblies containing plutonium parts. Application areas include observing gaps and joints in the course of device component assembly and making more accurate measurements in critical assemblies. Radiography will be conducted with a linear accelerator in a shielded area. This activity is presently conducted at various locations around LLNL making security costly and difficult; location within the Super Block will solve this problem. Some existing equipment will be relocated from other locations for use in this laboratory.

(c) Secondary Alarm Station

A secondary alarm station will be located in the Super Block. It will provide alarm and video monitoring for protective service officers, as well as communications to facilities and personnel supporting the protection of the Super Block. The Secondary Alarm Station will be capable of processing all alarm and video signals from the Protected Area and the Material Access or Vital Areas. The station will be hardened. The Central Alarm Station is part of the ongoing line item project 85-D-333. Wiring and other features unique to and tying this project to the Central Alarm Station are part of this FY 1987 line item project.

(d) Office Building (Trailer Replacement)

Temporary modular facilities are presently used throughout the Super Block to house employees and computer systems. All the temporary facilities will be removed. New offices will be constructed to house only the people that will work in the Super Block. This facility, approximately 20,000 square feet, will be integrated with Protected Area features such as vehicle barriers, intrusion detection systems, and the vehicle/pedestrian portals. Provisions for classified matter storage and use will be included. These facilities will be equipped with alarm rooms and secure containers for storage of classified matter.

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8. Brief physical description of project (contd)

(b) Three badge offices at approximately 3,700 square feet each will be added near three of the portals. One will be used for LLNL personnel and visitors, a second will be used for contractor personnel, and the third for vendors.

c. Site Utilities

The utility extensions required to serve the facilities include city water, demineralized water, natural gas, compressed air, power, communications, sanitary sewer, and storm sewer. These major utilities will be extended from mains located in the immediate vicinity of the proposed facilities. Some existing utility lines will have to be relocated. Additional emergency power will be required.

d. Interfaces

The components and systems used in the physical protection system for the Super Block and the Buffer Security System must interface with existing line item construction projects. The interfaces consist of electronics for alarm and assessment components as well as architectural modification for portals and hardened response/surveillance positions. Additional interfaces are required with existing electrical and mechanical equipment.

The requested FY 1987 funding will be used to initiate engineering and design Titles I and II for the Super Block, approximately $3,300,000, and Title I for the Buffer Security System, approximately $1,000,000.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide for upgrading/enhancement of physical protection at LLNL as required to meet current U.S. Department of Energy (DOE) threat guidance. Detailed evaluations of the safeguards posture of LLNL resulted in the identification of various areas of security interests and/or existing systems which require upgrading/enhancement. Justification for each item included in this project is as follows.

a. Super Block

The LLNL identified areas of security interests include special nuclear materials, vital equipment, and weapon devices. Protection of these security interests require Protected Areas around Material Access Areas and Vital Areas. The Laboratory determined that a cost-effective solution could be implemented by consolidating SNM security interests into one physical area to be called a "Super Block."

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9. Purpose, justification of need for, and scope of project (contd.)

The design for the protection of the high security interests in a unified Super Block is a balanced solution that considered the threat and both one-time and operational costs. The Super Block permits the concentration of detection and response resources while minimizing the deployment of expensive delay components.

The overall advantages for the Super Block concept are:

- The detection components and response force can be concentrated.
- The delay components can be concentrated.
- Uniform protection can be provided for all radiological sabotage targets.
- The Protected Area components for the isolation zone and the entry control points can be uniformly hardened.
- Forced penetration by mechanized transportation can be denied.
- Interior hardening can use fixed and activated barriers.
- Dual interior detection and delay zones for SNM in use can be provided.
- Security inspector(s) can be in hardened position(s) protecting SNM in storage.
- Single Protected Area and Material Access Area/Vital Area entry control points can be used for normal traffic.
- Roving security inspectors can be deployed to interdict adversary(s) before they gain their objectives.
- Adversary penetration time would exceed response force interdiction time and the probability of neutralization would be very high.

(1) Protected Area

Proposed initial detection and delay components, located on the perimeter of the Protected Area, satisfy DOE guidance. System design includes an isolation zone between inner and outer barriers which has detection through diverse alarm sensors and redundant assessment capabilities including a CCTV system. The isolation zone and the entry control points are uniformly hardened against penetration attempts. The outer barrier for the isolation zone will stop a forced action, as will the "pop-up" vehicle barriers at the portals. Aircraft obstacles within the Protected Area will preclude airborne assault. These fixed barriers require either an escalation of the initial penetration attempt or an increase in the size of the adversary team to support the escape transportation. In either case, the Protected Area components dilute the resources of a potential adversary.

The combination of detection and delay at the Protected Area will alert security forces and positively identify an adversary action immediately when an assault begins.

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9. Purpose, justification of need for, and scope of project (contd.)

The portals for the Protected Area are required to establish authorization and verify all personnel during ingress and egress. Personnel are required to be searched for contraband when they enter or exit the Protected Area. The portals will be hardened so that they can be employed as part of the tactical response for action in the Super Block and in support of the hardened response positions.

(2) Material Access Area/Vital Area

The Material Access Area and the Vital Area will have detection and delay deployed in concentric zones beginning at the boundaries of buildings. The construction of these buildings limit penetration paths to doors and utility ports. The doors will be limited per building by architectural treatment of hallways. Only one or two doors in each building needs to be used as normal entry control points, the remainder will be used for emergency or special purposes.

The portals in the Material Access Area/Vital Area will be used to establish authorization and verify all personnel during ingress and egress. The ingress and egress transactions will be logged. Personnel will be checked for SNM on egress.

The Material Access Area/Vital Area intrusion detection system provides the protective service officers with timely and accurate alarm and assessment from discrete facility locations. The diversity and redundancy provide multiple layers of alarm to sense sophisticated adversaries.

The building perimeter for each facility will need to be hardened to provide uniform delay. Typically, industrial hardening of doors and walls adds minutes of delay per barrier. Thus, multiple levels of industrial hardening are required as a minimum to provide sufficient response time.

A new barrier will be installed that provides up to tens of minutes of delay. The barrier is an access denial system which is an activated barrier. The combined effect of fixed barriers and activated barriers will provide the delay necessary to deploy the response force.

(3) Consolidated Vault, Radiographic Facility, and Secondary Alarm Station

(a) The vault of the Super Block is necessary for the consolidation of SNM from other laboratory areas on the LLNL site. Existing facilities within the Super Block have insufficient capacity to accept new material. Additionally, those materials being brought together in the new vault have source terms precluding random storage and handling. The vault perimeter must be protected by a Material Access Area. Colocation will result in reducing onsite SNM traffic and a significant reduction in accounting.

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9. Purpose, justification of need for, and scope of project (contd.)

(b) The radiography facility is required to examine materials or items that are stored, used, or manufactured within the Super Block. The movement of these materials out of the Super Block to an existing radiography facility creates an unacceptable security risk and programmatic cost.

(c) The secondary alarm station is an alternative to the central alarm station for protection of a Protected Area, Materials Access Area, and Vital Area. The secondary alarm station is located in the Super Block because of the inherent self-protection afforded by the Protected Area and because of the minimization of alarm and assessment cabling costs.

(4) Trailer Replacement

Protection of classified matter in the office building is required by DOE guidance. Those offices and areas using or storing matter will be equipped with the alarms and physical doors/locks.

The new offices are required to house personnel existing in temporary facilities in the Super Block. Temporary facilities, scattered throughout the Super Block, could provide concealment and protection of adversaries maneuvering to targeted facilities. Both exclusion tactics and containment tactics are rendered more difficult by these structures. The structures diminish the efficiency of the protective lighting and the effectiveness of surveillance cameras.

Also, the offices are necessary for the staff working in the Super Block so that they will transverse the Protected Area as infrequently as possible.

(5) Hardened Security Positions

Elevated, hardened response positions with clear lines of sight and fire will be used in the Super Block to support exclusion and containment tactics. The exclusion tactics require fewer personnel in defensive position to thwart an adversary attempt to reach an objective. The advantage of exclusion is that an adversary tactical action must begin immediately upon penetrating the Protected Area. These tactics deplete the adversary's available resources.

b. Buffer Security System

The Buffer Security System is being implemented to protect personnel and property in accordance with DOE guidance. Timely detection will permit effective response by protective forces and allow early warning for the Super Block. The accurate location and identification of an adversary permit the response forces to utilize tactics ranging from exclusion, for some key facilities, to containment for the site in general.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements II,
Lawrence Livermore National Laboratory,
Livermore, California

2. Project No.: 87-D-104

9. Purpose, justification of need for, and scope of project (contd.)

(1) Personnel Delay Fence/Vehicle Barriers

Two delay services will be used to control ground penetration. The personnel fence will delay the adversary for accurate assessment and time for response. The fence further acts as a deterrent for a less dedicated adversary. The vehicle barrier is used to disable vehicles from being used to transport quickly an adversary or quantities of contraband material.

(2) Perimeter Intrusion Detection and Assessment System

The Perimeter Intrusion Detection and Assessment System is used to provide assurance of adversary detection along the site perimeter. The site being somewhat longer than one mile on a side and containing a significant capital investment must be protected against known activities of unsophisticated groups which are opposed to the Laboratory's mission. The use of redundant alarms and assessment will assure timely detection against this level of adversary. Detection at the Perimeter Intrusion Detection and Assessment System will also activate a "heads-up" alert status at the Super Block.

(3) Patrol Road

The over four mile perimeter will require a patrol road to support personnel movement. The patrol road will provide high speed movement of protective vehicles for use by protective service officers in responding to positive detection of an adversary.

(4) Pedestrian/Vehicle Portals and Badge Offices

Laboratory programs and facilities are currently utilizing approximately 9,100 permanent and temporary personnel with many of the personnel working in areas requiring special authorization. To aid in the authorization process, only personnel who have gained prior approvals will be admitted to the general site. Portals are located on the four perimeter faces of the Laboratory to provide relatively uncongested ingress and egress. Badge offices are needed at key portals to support the general authorization process. Badging will be used to identify approved personnel. At selected times, thorough searches of vehicles for contraband is necessary. In these instances, vehicle holding areas permit this procedure with the remaining vehicle flow proceeding unhampered.

Locating shipping and receiving functions exterior to the buffer/isolation zone eliminates the need for a great number of uncleared people driving freight transportation vehicles to enter secured area.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Safeguards and security enhancements II, Lawrence Livermore National Laboratory, Livermore, California	2. Project No.: 87-D-104

9. Purpose, justification of need for, and scope of project (contd.)

c. Site Utilities

Utilities in the Super Block need to be enlarged in capacity and relocated to accommodate architectural changes caused by the establishment of the Protected Area boundary, removal of the temporary facilities, the new office building, and the addition to the Plutonium Facility. The existing electrical service will be relocated and increased in size and reliability to support the security upgrades.

The Buffer Security System will require new utilities to support the Perimeter Intrusion Detection and Assessment System and the new portals and badge offices. The Perimeter Intrusion Detection Assessment System will require civil and electrical upgrades. The portals and badge offices require electrical, water, and sewer to support personnel activities.

d. Interfaces

The Super Block provides a high degree of protection for high-value facilities and SNM. Some portion of the Buffer Protection System is required if the Laboratory is to utilize effectively the newly acquired and planned buffer lands to protect Government property. As a minimum, new fencing with vehicle barriers, patrol capabilities, portals, badge offices, and associated utilities are required. Also as a minimum, provisions should be made to incorporate a Perimeter Intrusion Detection Assessment System as proposed here. Both the Super Block and Buffer Protection System are integrated with ongoing project 85-D-103. Together, these projects will provide the levels of physical protection required.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements II, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 87-D-104

10. Details of cost estimates a/

	Item Cost	Total Cost
a. Engineering, design, and inspection		$ 7,370
(1) Facility engineering at approximately 16 percent of construction costs, item b	$ 5,390	
(2) Equipment engineering at approximately 20 percent of special equipment costs, item c	1,980	
b. Construction costs		34,410
Super Block		
(1) Protected Area Work, including grading, paving, demolition, exterior security provisions, and landscaping	3,010	
(2) Modifications to Material Access Area/Vital Area - 8,070 square feet at about $278 per square foot	2,240	
(3) Addition to Material Access Area - 44,600 square feet at about $160 per square foot	7,120	
(4) Office Building (Trailer Replacement) - 36,600 square feet at about $148 per square foot	5,400	
(5) Utilities, including mechanical utilities, sanitary and storm sewers, electrical power, communications, and area lighting	2,460	
Buffer Security System		
(6) Assessment Zone, including grading, paving, security provisions, and landscaping	2,410	
(7) Badge Offices (3) - 11,100 square feet at about $116 square foot	1,400	
(8) Portals (6), including associated utilities and fencing	4,260	
(9) Modifications for Shipping/Receiving	1,010	
(10) Installation of Perimeter Intrusion Detection/Assessment System	5,100	
c. Special equipment, including intrusion detection systems assessment systems, and alarm station		9,820
d. Standard equipment		5,940
Subtotal		57,540
e. Contingency at approximately 17 percent of above costs		9,860
Total estimated cost		$67,400

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a/ Estimate based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements II, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 87-D-104

11. Method of performance

Building design will be on the basis of a negotiated architect-engineer contract. Minor work and equipment procurement will be performed by LLNL forces. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total Project Funding						
(1) Total facility costs						
(a) Construction line item	$ 0	$ 2,900	$15,500	$29,500	$19,500	$67,400
Total facility costs	0	2,900	15,500	29,500	19,500	67,400
(2) Other project funding						
(a) Conceptual design costs	300	0	0	0	0	300
Total other project funding	300	0	0	0	0	300
Total project funding (items 1 and 2)	$ 300	$ 2,900	$15,500	$29,500	$19,500	$67,700

b. Other related funding requirements (estimated life of the project: 25 years)

(1) Facility operating costs	$ 183
(2) Programmatic operating expenses directly related to the facility	336
(3) GPP or other construction related to programmatic effort in the facility	100
Total other related funding requirements	$ 619

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   (1) Other project funding
      (a) Total funding in this classification represents the conceptual design cost.

b. Total related funding requirements
   (1) Facility operating costs

Operating costs of the new facilities are estimated to be $183,000 per year to include maintenance and utility cost.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements II,
Lawrence Livermore National Laboratory,
Livermore, California

2. Project No.: 87-D-104

13. Narrative explanation of total project funding and other related funding requirements (contd.)

(2) Programmatic operating expenses directly related to the facility

These are the additional operation and maintenance staff for the new facilities and equipment.

(3) GPP or other construction related to programmatic effort in the facility

Initially no GPP costs are anticipated, but, to keep abreast of technology, presently undefined alterations will likely be required in the future.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Decontamination and waste treatment facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 86-D-103

3. Date A-E work initiated: 1st Qtr. FY 1986

3a. Date physical construction starts: 2nd Qtr. FY 1987

4. Date construction ends: 1st Qtr. FY 1990

5. Previous cost estimate: $11,600
Date: 1/85

6. Current cost estimate: $36,400 a/
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$ 3,700	$ 3,700	$ 3,700	$ 3,500
1986 Sequestered	(0)	(100)	(100)	(0)
1987	5,400	5,400	5,400	3,800
1988	24,900	25,000	25,000	11,900
1989	2,400	2,400	2,400	15,300
1990	0	0	0	1,900

8. Brief physical description of project

This project will provide the Lawrence Livermore National Laboratory (LLNL) toxic waste control activities with new facilities for the decontamination and waste treatment functions. These facilities were initially proposed to be located adjacent to the existing solid waste disposal area in the southeast industrial sector of the LLNL site. However, because of the selected site's proximity to the Las Positas fault, the issuance of a "permit to construct" by the Department of Health Services (DOHS) and or Environmental Protection Agency (EPA) was dependent on the final results of a geologic investigation required by the DOHS and the Resource Conservation and Recovery Act when a new hazardous waste facility is located within 3,000 feet of an active fault. Results of the investigation indicated potential fault activity and DOHS would not approve the use of the site for a decontamination and waste treatment facility. Several alternative sites were investigated and an acceptable site has been selected in the northeast corner of the Livermore site. The total estimated cost of the project will increase to cover the extension of power, communications, and other utilities to the new site.

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a/ Recent earthquake faulting investigations require relocating the site for this facility and a consequent increase in the current cost estimate. Revision of the estimate is in progress.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Decontamination and waste treatment facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 86-D-103

8. Brief physical description of project (contd.)

This project will enhance hazardous waste management at the Laboratory through the addition of approximately 86,700 square feet of new facilities for the decontamination and waste treatment functions. The Decontamination and Waste Treatment Facility will consist of new building facilities and equipment which include a liquid waste process building, decontamination and solid waste processing and packaging building, rotary kiln incinerator with enclosure, uranium burn pan with enclosure, solid waste receiving and classification building, operations support building, emergency generator, electric substation, boiler/chiller plant, and cooling tower. Land improvements will include paving approximately 1,340 feet of roads and parking areas for operational and employee vehicles, fencing, and a surface drainage control system.

All new buildings will have fire sprinkler systems. Hazardous and radioactive waste processing areas will have curbed concrete floors to contain spillage and water from the fire sprinkler system. Special coatings will seal the inside surfaces and provide easier decontamination. Various filters, a condenser, exhaust air scrubber, liquid retention, and pressure gradient systems will be incorporated together with alarms and monitors to ensure safe operations and environment protection.

Utilities will consist of water, compressed air, gas, steam, power, communications, storm sewer, and sanitary sewer. Existing mechanical and electrical utility lines and the 230/115-kV lines will be rerouted so they will not encumber the construction area and operational activities. This work includes a 1500-kVA substation, a 500-kW emergency generator, two 240-ton chillers, an 1100-gpm cooling tower, and a 100-hp boiler.

The decontamination and dry waste facility, approximately 13,800 square feet, is a one-story reinforced concrete frame structure. The building is divided into two main areas--the decontamination area and the solid waste processing/packaging area. Each area is provided with a 2-ton bridge crane, a truck air lock, and a 2-ton monorail hoist. Change rooms, toilets, and lockers are arranged to serve both areas. The floor slab will be cast-in-place concrete with a smooth finish over a vapor barrier. The mezzanine level will be a concrete slab and concrete framing, finish of interior walls, floor and all exposed surfaces will be smooth and coated with epoxy coating, all doors between contaminated areas and noncontaminated areas will be air sealed. The processes to be performed in this facility are chemical and steam cleaning, grit blasting, vapor decontamination, electro-polishing, ultrasonic cleaning, and mercury bakeout. Other functions to be performed are dry waste sorting, compacting, bailing, and packaging for shipment. The facility will also have a laundry and drum/tank cleaning capability.

The liquid waste processing facility, approximately 49,800 square feet, is a one-story steel frame structure with a clear height of 35 feet in liquid treatment areas and 50 feet clear height in the filtration and solidification areas. The building is divided into two main areas--radioactive liquid treatment and nonradioactive liquid treatment. Each area is provided with a 2-ton bridge crane. All interior walls, ceilings, and steel structure will be covered with epoxy coating, floors will be smooth surfaces with polyester epoxy coating. The process to be performed in this facility include radioactive and

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Decontamination and waste treatment facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 86-D-103

8. Brief physical description of project (contd.)

nonradioactive liquid waste and radioactive oily waste chemical treatment; filter press, ultrafiltration, and reverse osmosis filtration, evaporative concentration, and solidification. The facility will also include analytical laboratory.

The solid waste receiving and classification building, approximately 6,900 square feet, will be an insulated prefabricated metal building with a slab-on-grade foundation. It will provide the space necessary to receive, segregate, and store chemical and radioactive containers of all types and sizes until the proper analysis and classification are completed and a determination made on the treatment, packaging, and shipping methods required to prepare properly the wastes for safe ultimate disposal.

The burn pan enclosure, approximately 860 square feet, will be a prefabricated metal structure on a bermed concrete slab. The specific objective of the burn pan is to provide a safe and efficient means of oxidizing depleted uranium chips while meeting all safety and regulatory requirements.

The incinerator building, approximately 1,500 square feet, will enclose the rotary kiln incinerator, shredder, feed system, and ash removal system and will be similar to the construction of the decontamination/solid waste building. The building will be provided with a one-ton bridge crane.

The operational support building, approximately 12,700 square feet, is a two-story steel frame office structure. It will provide central support for the four operational functions--decontamination, liquid waste treatment, solid waste processing, and storage. It will bring together the supervisory, administrative, technical, and operational personnel currently housed in dispersed locations. It will also house the toxic waste control computer system for tracking hazardous waste and providing online information on waste materials during emergency conditions.

The boiler/chiller plant, approximately 1,200 square feet, is a prefabricated metal building which will house the central plant heating and refrigeration systems. The equipment for this plant will include, but is not limited to, centrifugal-type heat recovery chillers, steam boiler, and a cooling tower.

Special facilities in the project include the following process system components and their installation: Pumps and agitators, tanks and vessels, heat exchangers, blowers, reverse osmosis units, ultrafiltration unit, flocculator/clarifier, filter presses, solidification equipment, compactor, incinerator, evaporative concentrator, and a burn pan unit.

Standard equipment encompasses various decontamination equipment, monitors and counters, security alarms and detectors, chemistry laboratory and office furniture, and shelving.

1. Title and location of project:	Decontamination and waste treatment facility, Lawrence Livermore National Laboratory, Livermore, California	2. Project No.: 86-D-103

8. Brief physical description of project (contd.)

Existing facilities handling the decontamination and liquid waste treatment work will be demolished or be decontaminated. Four modular buildings and a cylinder dock will be relocated and existing paved outdoor storage areas will be placed in other locations in order to clear the site for the new construction.

The total estimated cost (TEC) of this project has increased $24,800,000, from $11,600,000 to $36,400,000, as the result of a total rescoping of the project to bring the new design of the LLNL hazardous waste facilities into full compliance with the Resource Conservation and Recovery Act (RCRA) and its 1984 amendments. The original scope and TEC for this project was based on RCRA not applying to "activities subject to the Atomic Energy Act of 1954 except to the extent not inconsistent with the Atomic Energy Act." The Environmental Protection Agency had been informed of this position. Subsequently, based on a United States District Court decision to remove the Department of Energy (DOE) exemption to RCRA, the DOE and the EPA agreed in August 1984 that RCRA applies to facilities operated under the Atomic Energy Act which significantly changed the scope and TEC of this project. The deficiencies in the LLNL hazardous waste facilities have been substantiated by independent DOE/LLNL and regulatory agency inspections.

The FY 1987 funding will allow continuation of the design activities initiated with FY 1986 funding, perform environmental assessments and safety analyses and activities necessary to prepare required environmental permit.

9. Purpose, justification of need for, and scope of project

This project will replace the 40 year old, technically obsolete, structurally and environmentally submarginal decontamination facility and liquid waste treatment facility with new facilities. The existing facilities are located in a high-density area with insufficient surrounding space to allow the required expansion at their present sites.

Current facilities are in noncompliance with present day standards for environmental protection and seismic safety. Safe operation of these facilities (environmental and personnel) depends on administrative controls.

It is the intent of this project to provide a centralized Decontamination and Waste Treatment Facility which meets applicable Federal, state, and local environmental regulations and DOE Orders. If the existing facilities are not replaced, the state regulatory agencies will progressively impose tighter controls and restrictions such as prohibiting off-site hazardous waste shipments. This would force the Laboratory to stop operations when LLNL's waste storage capacity becomes unmanageable. The new design will bring the Laboratory's hazardous waste facilities into full compliance with the Resource Conservation and Recovery Act and its 1984 amendments. An environmental audit found the existing facilities deficient in the following areas:

o The present liquid waste treatment facilities cannot provide sufficient treatment to assure the effluent will meet the discharge limits established in the new City of Livermore sewer ordinance and the EPA electroplating and metal finishing standards of 40 CFR 413 and 433 as mandated in the Clean Water Act.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Decontamination and waste treatment facility, Lawrence Livermore National Laboratory, Livermore, California	2. Project No.: 86-D-103

9. Purpose, justification of need for, and scope of project (contd.)

- Because some nonradioactive hazardous liquid wastes are currently treated in the same treatment units as radioactive wastes, the nonradioactive wastes become contaminated and therefore cannot be disposed of as is required for a Resource Conservation & Recovery Act waste.
- The present facilities do not provide the necessary segregation, spill prevention, and containment to eliminate the potential for ground water contamination or assure compliance with Subpart I of 40 CFR 264 and California's Title 22, Chapter 30 minimum standards for hazardous and extremely hazardous waste management.
- The existing radioactive and mixed wastes solidification and decontamination buildings do not meet DOE ventilation, contamination, confinements and physical safeguard requirements. Additionally, the radioactive waste storage area does not provide the proper segregation, weather protection, or spill prevention and containment measures.
- There is presently no facility to react or neutralize exotic gases and chemicals which offsite commercial disposers will not accept. These chemicals therefore have to be stored indefinitely, creating a potentially dangerous condition.

Decontamination Facility

The existing decontamination facility is a structure built by the Navy in the early 1940's as a paint and dope shop. In the late 1950's, the structure was converted to a decontamination facility. Environmental and worker protection codes and practices have changed drastically since that time. Positive containment of radioactive substances is not always possible with the present building condition. A combination of a power failure (even though emergency power is available) and a breakdown of administrative controls, combined with a movement of material in or out of the outside door, could present a possibility of some contamination of the outside environment. Air locks for bringing in large equipment do not exist. The present electrical system is underpowered causing some operations to be delayed because all equipment cannot be operated at one time. As a result, the existing decontamination facility is wholly inadequate to meet the decontamination needs (volume and physical size), and the required containment of radio-toxic materials.

A facility designed to current standards and practices for radioactive materials processing is required. With improved ventilation and containment features and modern decontamination/cleaning equipment, the new facility will provide the weapons

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Decontamination and waste treatment facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 86-D-103

9. Purpose, justification of need for, and scope of project (contd.)

programs with new capability and increase the recovery of equipment and precious metals. Other specific advantages of the new decontamination facility are:

a. Environmentally safer and better equipped laboratories which meet current seismic standards for "critical facilities." This will allow decontaminating and cleaning, for reuse by the programs, of equipment and materials contaminated with radioactive and toxic chemicals.

b. Improved facilities for transferring, shipping, receiving, and storage of material and equipment.

c. Consolidation of the decontamination operations into a centralized area to increase the efficient use of manpower, material handling equipment, and process stream flows.

d. The facility will meet all known or presently proposed Federal and state regulations concerning safety and the protection of the environment.

Liquid waste treatment facility

The existing liquid waste treatment facility is an old engine test building built in the 1940's for use by the U. S. Navy. The facility has been modified to process radioactive and hazardous liquid waste. Today, it does not have the capacity to meet the present and future processing demands nor does it conform to environmental regulations governing this type of operation. A barrel storage building was constructed in FY 1982 and equipment added to increase processing capacity this year, but there is insufficient space to allow additional expansion and needed environmental control modifications at the present site. Specific advantages of this replacement include:

a. The new facility will provide sufficient treatment to assure meeting the new restrictive discharge limits established by regulators.

b. Separate radioactive and nonradioactive liquid waste processing lines including a radioactive oily waste treatment system to comply with environmental regulations and DOE orders.

c. The increased nonradioactive processing capacity will greatly reduce the needs for offsite commerical treatment and disposal of hazardous liquid wastes, decreasing the environmental risks and future liability to LLNL for these offsite operations. Offsite treatment and disposal is becoming progressively more costly and future disposal operations are nebulous and continue to shrink.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Decontamination and waste treatment facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 86-D-103

9. Purpose, justification of need for, and scope of project (contd.)

d. Close capture ventilation and spill containment systems will provide the necessary environmental controls and personnel protection.

e. Construction will be designed to meet current seismic standards.

f. Consolidating the liquid waste operation into a centralized hazardous waste management facility will optimize manpower and facility utilization.

Solid Waste Receiving and Classification Facility

Receiving and classification is currently being performed in an open shed with limited space, resulting in many containers being stored outdoors. There are no facilities to segregate properly incompatible wastes and nothing to contain spills or container ruptures as required by the Resource Conservation and Recovery Act, California hazardous wastes regulations, and DOE orders. The new facility will provide the space necessary to receive, segregate, and store chemical and radioactive containers of all types and sizes until the proper analysis and classification is completed and a determination made on the treatment, packaging, and shipping methods required to prepare them properly for ultimate safe disposal. An office will be included in the facility for maintaining incoming and outgoing shipping documentation and inputting to the central computer through a terminal.

Burn Pan

Laboratory operations generate depleted uranium chips which must be oxidized and stabilized into a waste form which is safe for shipment and disposal. These chips will continue to be generated by the programs and must be processed.

Incinerator

The existing controlled air incinerator was orginally built in early 1978 and is currently in the process of being upgraded to meet Resource Conservation and Recovery Act requirements; however, by 1991, when the proposed facility is expected to be activated, the present incinerator will be near the end of its useful life and cannot be presumed to last much longer if used continually. Additionally, the old incinerator cannot handle the diverse mix of radioactive, mixed, and hazardous solid and liquid waste which require incineration in order to diminish their toxicity and volume. It is proposed to install a small rotary kiln incinerator, with a shredder at the input end and a complete scrubber and pollution abatement system on the discharge, to incinerate and destroy all types of both radioactive and nonradioactive organics, solvents, oils, miscellaneous chemicals, and solid wastes in an environmentally complying manner. The resultant waste residue would accordingly meet the intent of the 1984 Resource Conservation and Recovery Act amendments and consequently reduce LLNL's risk and liability for

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Decontamination and waste treatment facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 86-D-103

9. Purpose, justification of need for, and scope of project (contd.)

offsite disposal. The permitting process for this unit is expected to be extensive; however, proposals to construct similar units in the Bay Area have been positively received by the regulatory agencies. Incineration is one of the preferred emerging technologies for hazardous waste treatment by both industry and the regulators. The old incinerator would remain for standby use and for the incineration of classified documents.

Operational support facility

This general purpose facility will be designed to support the four major operational functions: decontamination, liquid waste treatment, solid waste processing, and storage. The facility will bring together the technical and staff personnel currently fragmented in trailers and the existing dislocated facilities, plus new personnel. It will also house the toxic waste control computer system for tracking hazardous waste and will provide online information on waste material in an emergency.

The support facility will also provide a training room for personnel. The training of hazardous waste handling personnel is mandatory and required by law. Recertification of personnel is required every six months.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Decontamination and waste treatment facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 86-D-103

10. Details of cost estimates a/

	Item cost	Total cost
a. Engineering, design, and inspection		$ 4,580
(1) Construction at 17 percent of Contruction Costs, item b		
Title I & II	$ 2,060	
Title III	1,495	
(2) Environmental Assessments, Safety Analysis Reports, and Environmental Permits to Construct and Operate	1,025	
b. Construction costs		22,160
(1) Improvements to land, including grading, paving, parking, fencing, walks, and landscaping	$ 650	
(2) Buildings		
Decontamination and dry waste-13,755 square feet at approximately $168 per square foot	2,310	
Liquid waste (Process)-49,815 square feet at approximately $98 per square foot	4,890	
Solid Waste Receiving and Classification-6,900 square feet at approximately $57 per square foot	395	
Burn Pan & Boiler/Chiller Plant-2,010 sq feet at approximately $119 per square foot	240	
Incinerator-1,500 square feet at approximately $300 per square foot	450	
Operational support-12,682 square feet at approximately $109 per square foot	1,380	
(3) Special facilities including walk-in/decontamination hoods, treatment tanks, and equipment	10,010	
(4) Utilities, including mechanical utilities, sanitary and storm sewers, electrical power, communications, and area lighting	1,835	
c. Standard equipment		1,810
d. Removal, decontamination, and relocation costs		2,180
Subtotal		30,730
e. Contingency at approximately 18 percent of above costs		5,670
Total estimated cost		$36,400

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Decontamination and waste treatment facility, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 86-D-103

11. Method of performance

Design will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding. Minor work will be performed by LLNL employees.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 3,500	$ 3,800	$11,900	$15,300	$ 1,900	$36,400
Total facility costs	3,500	3,800	11,900	15,300	1,900	36,400
2. Other project funding						
(a) Conceptual design costs	450	0	0	0	0	450
(b) Other project related costs	300	0	0	0	0	300
Total other project funding	750	0	0	0	0	750
Total project costs (items 1 and 2)	$ 4,250	$ 3,800	$11,900	$15,300	$ 1,900	$37,150

b. Other related funding requirements (estimated life of project: 25 years)	
1. Facility operating costs	$ 2,193
2. Programmatic operating expenses directly related to the facility	3,930
3. Capital equipment not related to construction but related to the programmatic effort in the facility	300
4. GPP or other construction related to programmatic effort in the facility	150
Total other related annual funding requirements	$ 6,573

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project costs
      (a) Total funding in this classification represents the waste management study and the conceptual design cost.
      (b) These costs were incurred in performing required site seismic investigations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Decontamination and waste treatment facility, Lawrence Livermore National Laboratory, Livermore, California	2. Project No.: [illegible]

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Other related funding requirements

1. Facility operating costs

Facility operating costs include utilities and maintenance and offsite disposal costs.

2. Programmatic operating expenses directly related to the facility

Programmatic operating expenses represent an estimate for 47 toxic waste control and support personnel in FY 1981.

3. Capital equipment not related to construction but related to the programmatic effort in the facility

Capital equipment not related to construction but related to the programmatic effort in the facility is an average annual estimate which includes both the small items needed for continuous operation of the facility and the occasional large item (over $200,000) which cannot be described at this time but can be predicted as needed to maintain technical excellence in efforts conducted in the facility.

4. GPP or other construction related to programmatic effort in the facility

Initially, no GPP costs are anticipated but, to keep abreast of technology, presently undefined alterations will likely be required in the future.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Strategic defenses facility, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 86-D-104

3. Date A-E work initiated: 2nd Qtr. FY 1986

3a. Date physical construction starts: 3rd Qtr. FY 1987

4. Date construction ends: 3rd Qtr. FY 1990

5. Previous cost estimate: $70,000
Date: 1/85

6. Current cost estimate: $ 70,000 a/
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$ 4,000	$ 2,000	$ 2,000	$ 1,000
1987	13,000	15,000	15,000	8,000
1988	15,000	15,000	15,000	14,000
1989	3,000	3,000	3,000	10,000
1990	0	0	0	2,000

8. Brief physical description of project

This project provides for the construction of heavy laboratory space suitable for research and development (R&D) of directed energy weapons in the form of particle beams, x-ray lasers, microwaves, and kinetic energy (i.e., high velocity projectiles), light laboratory and office space maintenance facility for field engineering instrumentation vans, an instrumentation van modification and check-out facility, a radioactive experiment decontamination facility, and paved parking and storage areas.

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a/ The Conference Committee report accompanying Public Law 99-145 included language which stated that Congress expected cost sharing of this project with the Department of Defense's Strategic Defenses Initiative Organization. The Department of Energy's share of the construction costs is $35,000,000. The financial schedules in sections 7 and 12 reflect the $35,000,000. The details of the cost estimate in section 10 reflect the full $70,000,000.

1. Title and location of project: Strategic defenses facility, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 86-D-104

8. Brief physical description of project (contd.)

The proposed strategic defenses facility (SDF) consists of approximately 246,000 square feet of gross space in three separate buildings. The first building is a universal high bay/low bay laboratory building with approximately 75,000 square feet of space with dual bridge crane coverage in the high bay. Multiple directed energy machines will have individual, local, relocatable radiation shielding to allow for equipment rearrangement with only minor disruption to other experiments. The high bay/low bay laboratory building also contains light laboratory space for support facilities, including mechanical and electrical equipment rooms for conventional facility electrical distribution and heating, ventilating, and air-conditioning systems, multiple data acquisition/data processing systems, and control/monitor systems to support the high bay experiments. The second building will be a multistory office/light laboratory with a full basement of approximately 165,000 square feet. This building will have a modular design to facilitate varying the size of laboratory and office spaces in minimum time and at low cost as requirements change. This building will be four stories high with basement, mechanical penthouse, and conference facilities. The third building is a maintenance and mechanical building of approximately 6,000 square feet, having a maintenance shop area for instrumentation vans, a boiler room, and a underground test experiment decontamination facility.

The high bay/low bay laboratory and the maintenance and mechanical building will be constructed of prestressed, precast concrete wall and roof panels with integral insulation, and the office/light laboratory will be constructed of cast-in-place concrete structural frame with prestressed precast walls and floors. A built-up roof over insulation panels will complete the building shells. Special insulating liquid storage will be provided in a minimum sized tank farm. Future requirements will be satisfied by exercising a preplanned expansion of the existing simulation technology laboratory liquid storage/process/transfer facility.

Site work will consist of paved streets and a parking area within the complex and extension of the perimeter fence. Utilities, including water, sewer, underground power, communications, and natural gas will be extended from existing nearby utility systems.

9. Purpose, justification of need for, and scope of project

Justification for the SDF is based on the fact that future United States strategic defensive systems will require new laboratory space to conduct experimental research on various directed energy weapon concepts. Laboratory space does not presently exist at Sandia National Laboratories, Albuquerque, to support strategic defense initiative (SDI) experimental research without cancelling existing high-priority programs. Research conducted in the SDF will explore the basic physics issues and will treat initial technical feasibility of concepts for particle beams, x-ray lasers, microwaves, and kinetic energy weapons. Evaluation of the utility of the various advanced defensive-directed energy weapons concepts will be based on theoretical/experimental lethality characteristics, vulnerability susceptibility to postulated hostile environments, and their cost effectiveness. Complete evaluation will require both laboratory and underground nuclear effects experiments.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Strategic defenses facility, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 86-D-104

9. Purpose, justification of need for, and scope of project (contd.)

As presently defined, the SDF will provide space for both the SDI experimental program and the field engineering capability necessary to support the SNLA underground test program. Colocation of the staff associated with these two programs will create a synergistic effect beneficial to both programs. Implementation of directed energy weapons research and underground nuclear test experiments require several common areas of technology that previously have been separated at SNLA. One area of common technology is high speed data acquisition from experiments exposed to hostile environments. Radiation effects on data sensors and data transmission cables are extremely important. Both programs have been working on the development of very high speed, data recorders to support similar recording requirements. The underground test field engineering experience will be required to design and implement some of the SDI experiments planned for the SDF laboratory in Albuquerque and at the Nevada Test Site (NTS) in Nevada.

In the development of SDI technology, particle beam acceleration, plasmoid formation and propagation, and electrical energy sources will have to be studied. This facility will allow experiments to increase the understanding of accelerator operation and scalability; plasmoid formation, stability and propagation; investigation of issues related to underground experiments and development of advanced sources of directed energy; and research into the construction of compact, lightweight accelerators with work on compact accelerator cavities, switching technology, dielectrics, and power conditioning.

The SDF facility is also required to support x-ray laser experiments and laser lethality issues; to develop improved high-frequency and electromagnetic simulation testing capabilities to be applied in determining the vulnerability of complex weapon systems; and to develop advanced kinetic energy weapons testing capabilities in the areas of projectile survivability and launch facilities with realistic projectile weights and volume.

In addition to the development of directed energy-related weapons, this facility will house the engineering and field test support staff for weapons and weapons component tests at the NTS. Currently, many of the staff assigned to these activities are housed in temporary, substandard, and energy-inefficient quarters at widely scattered locations. This facility will also provide adequate docking facilities (which currently do not exist) to repair and modify NTS recording trailers between underground test shots. The SDF facility will also provide environmentally safe laboratory space for post-shot examination of contaminated and radioactive experiments exposed in underground effects tests which do not exist.

The FY 1987 funding will initiate construction of the building including site preparation, structure, and utilities. Design will continue on the special equipment to be housed in the new facility. Procurement of some long lead-time equipment will also be accomplished.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Strategic defenses facility, Sandia National Laboratories, Albuquerque, New Mexico
2. Project No.: 86-D-104

10. Details of cost estimates a/

	Item Cost	Total cost
a. Engineering, design, and inspection		$ 8,400
(1) Facility engineering at approximately 13 percent of construction costs, item b	$ 3,400	
(2) Equipment engineering at approximately 22 percent of special equipment costs, item e	5,000	
b. Construction costs		24,500
(1) Improvements to land	1,200	
(2) Buildings		
(a) Light laboratory and office building, approximately 165,000 square feet at about $87 per square foot	14,300	
(b) High/low bay building, approximately 75,000 square feet at about $108 per square foot	8,100	
(c) Maintenance and mechanical building, approximately 6,000 square feet at about $83 per square foot	500	
(3) Utilities	400	
c. Standard equipment		4,100
d. Relocation of existing equipment		1,900
e. Special equipment, including accelerator components, data acquisition, control-monitor, and diagnostic equipment		22,100
Subtotal		61,000
f. Contingency at approximately 15 percent of above costs		9,000
Total estimated cost		$70,000

11. Method of performance

Design and procurement of the conventional facilities will be performed under negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Strategic defenses facility, Sandia National Laboratories, Albuquerque, New Mexico
2. Project No.: 86-D-104

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 1,000	$ 8,000	$ 14,000	$ 10,000	$ 2,000	$ 35,000
(b) Inventories	0	300	500	2,000	500	3,300
Total facility costs	1,000	8,300	14,500	12,000	2,500	38,300
2. Other project funding						
(a) Conceptual design costs	30	0	0	0	0	30
(b) Other project related funding	0	2,000	3,000	3,000	2,500	10,500
Total other project funding	30	2,000	3,000	3,000	2,500	10,530
Total project funding (item 1 & 2)	$ 1,030	$ 10,300	$ 17,500	$ 15,000	$ 5,000	$ 48,830

b. Other related funding requirements (estimated life of project: 50 years)

1. Facility operating costs	$ 1,100
2. Programmatic operating expenses directly related to the facility	6,000
3. Capital equipment not related to construction, but related to the programmatic effort in the facility	500
4. GPP or other construction related to programmatic effort in the facility	100
Total other related costs	$ 7,700

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Total facility costs

(a) Inventories, start-up supplies, and spare parts for special equipment are estimated at $3,300,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Strategic defenses facility, Sandia National Laboratories, Albuquerque, New Mexico	2. Project No.: 86-D-104

13. Narrative explanation of total project funding and other related funding requirements (contd.)

2. Other project funding
   (a) Conceptual design costs of $30,000 was necessary to develop budget-quality cost estimate and construction schedule.

   (b) Research and development funding of $10,500,000 to supplement Title II for the development of a design to accommodate highly specialized equipment is required.

b. Total related funding requirements
   1. Facility operating costs
      (a) These are the costs of unrecoverable materials and expenses used during operating and maintenance activities which include chemicals, gases, lubricants, waste disposal, and maintenance of steam and condensate lines.

   2. Programmatic operating expenses directly related to the facility
      These are the operation and maintenance staff requirements for the facility.

   3. Capital equipment not related to construction but related to the programmatic effort in the facility
      This represents an estimate of the equipment requirements to maintain the annual programmatic effort.

   4. GPP or other construction related to programmatic effort in the facility
      This represents an estimate of the construction requirements to maintain the annual programmatic effort.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Instrumentation Systems Laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 86-D-105

3. Date A-E work initiated: 2nd Qtr. FY 1986

3a. Date physical construction starts: 2nd Qtr. FY 1987

4. Date construction ends: 3rd Qtr. FY 1989

5. Previous cost estimate: None
Date:

6. Current cost estimate: $20,000
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$ 6,200	$ 3,100	$ 3,100	$ 300
1987	5,800	8,900	8,900	4,000
1988	8,000	8,000	8,000	8,400
1989	0	0	0	6,700

8. Brief physical description of project

This project will provide for a light laboratory and office building having four stories and a full basement, approximately 146,000 square feet gross area and will be a site adaption of two previously built buildings. The building will have a modular design to facilitate varying the size of laboratory and office spaces in minimum time and at low cost as requirements change. Movable partitions will be used throughout, except around fixed areas such as stairwells, elevators, and utility chases to facilitate rearrangements. Service areas, including stairs, toilets, and elevators will have masonry unit walls and gypsum board ceilings. Exterior walls will be insulated precast concrete with heat reducing glass windows.

The heating, ventilating, and air-conditioning systems include a double duct, variable air volume (VAV) perimeter heating/cooling system, and a core or interior single duct VAV system. Interior plumbing systems will include sanitary waste, domestic hot and cold water, compressed air, natural gas, and chilled water supply and return. Exhaust will be provided by utility fan sets on the roof with exhaust ducts installed in the utility chases. Lighting in the office and lab areas will be designed for approximately 70 footcandles with switches to allow for task lighting. A Technical Control Center (TCC) will be installed to provide connections to the Sandia Computing Communications Network. This TCC will be the focal point for all computer communications within this building and to the rest of the Sandia complex. New equipment will include a Thermal-Vacuum System for Satellite Systems Testing.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Instrumentation systems laboratory, Sandia National Laboratories, Albuquerque, New Mexico	2. Project No.: 86-D-105

6. Brief physical description of project (contd.)

Exterior utilities will include a primary electric feeder, signal duct, steam and condensate lines, water, natural gas, and sanitary sewer. Area improvements will include storm drain inlets, paved parking, and service and driveway areas. Construction will be designed to conserve energy.

Major technical programs to be located in this new facility include: (1) development of telemetry systems to support weapon joint test assemblies (JTA) and flight evaluations; (2) weapon aircraft compatibility interfacing; (3) satellite instrumentation system development associated with nuclear burst treaty verification and monitoring; (4) development of unique new instrumentation systems for verification, diagnostic, and (5) new strategic defense initiative instrumentation activity in support of target tracking, focusing, orientation, and damage assessment.

The $1,000,000 in new equipment will provide, among other things, a needed second thermal vacuum chamber for the verification and control satellite program. Before the existing thermal vacuum chamber is dismantled and moved, the new chamber must be operational to support the delivery commitment schedule. The chamber consists of a thermal shroud inside the vacuum holding well with controls, forepumps, and cryogenic molecular pumps external.

The FY 1987 funding will continue construction of the structure, procure long-lead items to be installed in the building, and initiate Titles I and II design of the occupancy phase of the project.

7. Purpose, justification of need for, and scope of project

Reliability testing of future nuclear weapon systems, such as the TRIDENT II missile and the B-61 bomb, Mods 6 and 8, requires major technology and development advances in order to permit monitoring more weapon functions during test firing of configurations which, additionally, must be more representative of actual war reserve (WR) weapons. This instrumentation technology must be developed simultaneously with the weapons.

Weapon JTA/Flight Telemetry Systems

The necessity for system level tests such as JTAs, that JTAs should be as identical to the WR weapon as possible and must yield a complete set of credible diagnostic measurements is clear. Meeting the contradictory goals of completeness and minimum intrusion requires sophisticated mechanical and electrical instrumentation designs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Instrumentation systems laboratory,
Sandia National Laboratories,
Albuquerque, New Mexico

2. Project No.: 86-D-105

9. Purpose, justification of need for, and scope of project (contd.)

As nuclear weapons have gained new capabilities, such as advanced arming, fusing and firing systems, and comprehensive security and safing systems; the flight instrumentation to measure system reliability has also grown in complexity. Modern telemetry systems will include an order-of-magnitude more active devices than in current systems. They enable encoding and broadcasting of the outputs of several hundred sensors throughout the weapon system being tested. Future instrumentation systems must use multi-microprocessors and specialized sensors to monitor the performance data essential for proper and complete reliability assessment. This technology will not only be a necessary component in development testing.

High performance reentry vehicle (RV) systems, such as the TRIDENT II, create special requirements for the JTA telemetry. The instrumentation must be comprehensive, since the systems cannot be recovered for laboratory examination. Numerous sensors must be distributed throughout the RV. The data from these sensors must be collected, encoded, processed for data compression, and recorded to be broadcast after the extended blackout (associated with its high performance reentry) and obviously before water entry.

Laboratory facilities are inadequate for the new technology microprocessor based telemetry development. Failure to provide adequate, timely facilities will significantly increase the risk of development problems in JTA telemetry and, consequently, will increase the potential for stockpile weapons having undiscovered problems.

Weapons/Carriers Compatibility

There is concern for subtle interactions between the weapon electronics and the extensive and complicated electronics of modern aircraft. Communication with all weapons on board is through this combined software and hardware system. It is the Department's responsibility to ensure this interface works correctly, and to anticipate, analyze, and answer all questions in real-time when abnormal displays about the on-board nuclear weapon stores are encountered. This new task is much more demanding than for older aircraft for which communication is accomplished by simply rotating switches in both the weapon and aircraft. Future weapon safety devices requiring unique signals (specified sequences of pulses) and software-driven avionic electronics now make the guaranteeing of weapon and aircraft compatibility a much more challenging task. Laboratory space is urgently needed for development of computer-based simulators for this task and is needed in time to support operational status of modern strategic aircraft being developed.

Providing adequate laboratory space for this activity will assure the Department's ability to carry out its responsibility to the Department of Defense (DOD) in maintaining the nation's nuclear weapons stores.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Instrumentation systems laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 86-D-105

9. Purpose, justification of need for, and scope of project (contd.)

Verification and Control

The Department's interests in highly reliable instrumentation and sensors for the weapons program strongly parallel those of the Department's International Security Affairs program in its satellite applications. Developments in either arena provide complementary benefits to both programs.

For several years there has been a severe need for more specialized laboratory space, dust-controlled "grey" rooms, thermal-vacuum chambers, etc., to meet the requirements of expanding verification and control technology (V&CT) activities aimed at monitoring and verifying international compliance with provisions of the Limited Test Ban Treaty (LTBT). Earth and endoatmospheric monitoring is accomplished by satellite instrumentation whose development at SNLA is co-funded by the Department of Energy (DOE) which emphasizes optical sensor development, and by the DOD which supports the associated data-handling hardware and software development. DOD provides funds for integration of all DOE-provided instrumentation on DOD satellites. Originally, these latter instruments were to be provided by industry, but commercial sources were unable to meet DOD requirements.

The V&CT program funded by DOE is already evolving plans for satellite instrumentation to include strategic defense initiative (SDI) measurements.

DOE (Sandia) is currently hampered in accomplishing its mission as the national center for development of nuclear burst verification and reporting systems for satellite applications because of the inadequate and scattered space. All systems after 1989 will be launched by the space transport system and will require additional testing in order to qualify them for manned space flights. Sandia will be unable to meet its obligations to both DOD and DOE without additional laboratories, grey rooms, and thermal vacuum chambers.

Special Laboratories

Electronic assemblies for telemetry and satellite applications require specialized laboratories. Assembly of microelectronic devices requires a controlled environment (clean, dry, and static-free). With LSI chip features smaller than five microns wide, assembly air must be thoroughly filtered and dried. The presence of particles or moisture destroys devices when voltage is applied; under the best of circumstances this requires rework and, under all circumstances, it reduces the probability of successful performance.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Instrumentation systems laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 86-D-105

9. Purpose, justification of need for, and scope of project (contd.)

Extensive test equipment and computer-aided engineering (CAE) workstations are required to develop and evaluate flight-telemetry designs. This equipment also must be in a controlled environment (temperature, moisture, and dust), which is impossible to maintain in warehouses or other substandard work environments which cause equipment downtime and reduced operating life.

Satellite instrumentation development will need new specialized laboratories and additional equipment and procedures in order to meet increased safety certification and reliability testing that will be required for manned space launches in 1989. This requires additional temperature-cycling of payloads under high vacuum conditions, clean and grey room space for certified integration, calibration and testing of subsystems and other safety-critical components, and for the controlled modification and repair of production-quality instrumentation.

Approximately half of the people directly involved in these activities occupy mobile offices, temporary buildings, and World War II Butler-type buildings, all of which are substandard, wasteful of energy, costly to maintain, and completely unsuitable for modern laboratory activities involving microelectronics. Nineteen of these buildings will be surplused as a result of this construction.

The other half work in overcrowded laboratories. This problem has grown acute as detailed above because:

--Telemetry development for stockpile verification requires CAE, test equipment, and clean assembly which cannot be accommodated in present facilities.

--The compatibility of the modern bomb (and other weapons) with the modern aircraft (and other carriers) requires space for computer-based simulators.

--Those SDI instrumentation needs which are closely coupled technologically to the above activities need colocated laboratory space to promote desired synergism.

--The satellite-based verification and control program needs new space for grey rooms, thermal chambers, and testers to meet the 1989 requirements for manned space transport launch.

--Activities in V&CT and SDI are so technologically similar to those of the weapons activities JTA program that colocating these three functions will directly benefit the weapons activities through the synergistic interaction of these three groups. For example, electronic devices and circuits that are flight qualified by these groups can be utilized by the JTA program.

The instrumentation systems building is a high priority project which is critically needed by the weapons complex.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Instrumentation systems laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 86-D-105

10. Details of cost estimates a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 7 percent of construction costs, item b		$ 1,100
b. Construction costs		11,200
(1) Site improvements	$ 300	
(2) Building construction, approximately 146,000 square feet at about $70 per square foot	10,200	
(3) Utilities	700	
c. Equipment		5,800
(1) Standard equipment	1,000	
(2) Relocate existing equipment	4,800	
Subtotal		18,100
e. Contingency at approximately 10.5 percent of above costs		1,900
Total estimated cost		$20,000

11. Method of performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be performed under a negotiated fixed-price contract awarded on the basis of competitive bidding.

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Instrumentation systems laboratory, Sandia National Laboratories, Albuquerque, New Mexico	2. Project No.: 86-D-105

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1986	FY 1987	FY 1988	FY 1989	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 0	$ 900	$ 4,000	$ 8,400	$ 6,700	$20,000
Total facility costs	0	900	4,000	8,400	6,700	20,000
2. Other project funding						
(a) Conceptual design costs	20	0	0	0	0	20
Total other project funding	20	0	0	0	0	20
Total project costs (items 1 and 2)	$ 20	$ 900	$ 4,000	$ 8,400	$ 6,700	$20,020

b. Other related funding requirements (estimated life of project: 50 years)	
1. Facility operating costs	$ 1,200
2. Programmatic operating expenses directly related to the facility	34,500
Total other related annual funding requirements	$35,700

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project costs

      (a) Conceptual design costs
      A conceptual design was prepared for this project at a cost of $20,000.

b. Other related funding requirements
   1. Facility operating costs

      Facility operating costs include utilities and costs of unrecoverable materials and expenses used during operating and maintenance activities. Includes chemicals, gases, lubricants, waste disposal, and maintenance.

   2. Programmatic operating expenses directly related to the facility

      Programmatic operating expenses include the operation and maintenance staff requirements, including approximately 345 persons at $100,000 per year per person.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Laboratory Data Communications Center, Los Alamos National Laboratory, Los Alamos, New Mexico

2. Project No.: 86-D-[illegible]

3. Date A-E work initiated: 1st Qtr. FY 1986

3a. Date physical construction starts: 3rd Qtr. FY 1986

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: None
Date: None

6. Current cost estimate: $25,000
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$ 3,000	$ 1,000	$ 1,000	$ 500
1987	12,000	14,000	14,000	7,500
1988	10,000	10,000	10,000	17,000

8. Brief physical description of project

The facility to be constructed is a new four-story building of approximately 80,000 square feet in area and Uniform Building Code (UBC) Type II fire-resistive construction. Approximately 60,000 square feet of raised access floor will be included. Demountable walls will be constructed on the raised access floors to facilitate future equipment installation and reconfiguration. The proposed facility will be a functional adjunct to the Central Computing Facility (CCF). However, the fire protection and security requirements dictate that the Laboratory Data Communications Center (LDCC) be in a separate building within required proximity of 300 feet (cable length) to the CCF. The proposed facility will provide expansion capability for projected computing and telecommunications growth for the next decade.

The following additional physical descriptions are provided to better describe the functional needs of the project:

The lower floor (first level) is to be of concrete slab construction and will contain building and computer support equipment. This equipment includes several load center unit substations, switching and protective equipment, electrical motor generator systems, an uninterruptible power supply (UPS) providing 15 minutes backup power for specific equipment, a chilled water unit to serve the private automated branch exchange (PABX), a battery room for the UPS and battery backup for the PABX equipment, and the heating, ventilating, and air-conditioning systems (HVAC) equipment, including chiller units and associated pumps, piping, and controls. This area will also provide space for a receiving and shipping area and communications maintenance shops.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Laboratory Data Communications Center, Los Alamos National Laboratory, Los Alamos, New Mexico	2. Project No.:	88-D-106

6. Brief physical description of project (contd.)

dispatch. This floor will be constructed at grade level and will be approximately 21,000 square feet, sized to accept future increases in mechanical-electrical support equipment.

The second floor (second level) will be approximately 21,000 square feet, entirely of raised access floor construction. This level will be used primarily for next-generation Class VII and Class VIII supercomputers. Major computers are located at this level to minimize output cable lengths and the dedicated compressor-chiller piping distance. By suitable networking, these computers will be utilized as integral parts of the CCF "worker machine" inventory. This level, in effect, expands the CCF super-computer area, utilizing the CCF I/O (input-output) control and output processing equipment. (Major computers for this level are not a part of this construction project request.) The floor of this level must be able to support the floor load of 300 pounds per square foot for the supercomputers.

A pedestrian passageway will connect the second level of the LDCC to the second level of CCF. This passageway will be 6,000 square feet, providing approximately 5,000 square feet of office space and accessible interconnecting signal cable ducting between the two buildings.

The third floor, to be referred to primarily as the networking area, provides a raised access floor of approximately 21,000 square feet for terminals, ports, communications lines, port switches (computers), and worker computer concentrators. The networking function switches various data-rate lines within the integrated computer network (ICN), performs the network security controller function, and switches high data-rate channels to distributed (outlying) processing stations served by the high data-rate extended network (XNET) system. Laboratory space for maintenance, preoperational setups, and checkout and necessary support offices is provided. (Funds for networking equipment are not included in this construction project request.)

The upper floor (fourth level) will be approximately 21,000 square feet entirely of raised access floor construction, including office and integrated voice/data communications areas. This level will be the PBX switching center, as well as the location from which all future site telephone operations and maintenance will be directed. Data communications, transmitted by means of telephone circuits, are necessarily a part of this operation and are functionally related to the third floor networking system. Laboratory maintenance areas and necessary support offices will be provided.

The roof area, above the fourth level, will be constructed to support possible roof-mounted mechanical equipment, such as air-handling equipment. Extension of the freight elevator to the roof level will be considered.

The facility, at its anticipated full capability, will require an extensive utility load, primarily electrical power and cooling capacity. The cooling requirement exceeds present cooling-tower capability, and additional cooling-tower capacity and cooling water supply and return lines are included in the cost estimate. Initial capability is sized for an estimated

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Laboratory Data Communications Center,
Los Alamos National Laboratory,
Los Alamos, New Mexico

2. Project No.: 86-D-106

8. Brief physical description of project (contd.)

ten-year growth. Additional 13.2-kV underground power distribution lines (including back-up alternate routing) will be required. Initial capacity is sized for an estimated ten-year growth.

Fire protection will be provided in all areas by a wet-pipe sprinkler system and an automatic Halon system in subfloor and chase areas. Cable chase areas will allow floor-to-floor wiring penetration but will provide between-floor fire separation. A smoke control or exhaust system and fire-rated compartmentalization will be considered.

The facility will be in a secure controlled-access area. Security is required, not only because classified data will be handled within the facility, but physical security of network equipment, data communications, and system support equipment is required. A secondary security system within the building will allow controlled access to operating areas on all levels. This system will include guard stations and personnel monitoring systems.

Standard equipment will include passenger elevator, freight elevator, laboratory work benches, and minor furnishings.

A 200-car parking lot will be constructed of an asphalt cement surface in a location compatible with the Long Range Site Development Plan and the Five-Year Implementation Plan. A tunnel will be constructed for pedestrian traffic from the parking lot across a major thoroughfare to the building.

FY 1987 obligations will include: Title I and Title II design for the building, and procurement and installation of cooling tower, installation of cooling water supply and return lines, installation of primary and backup 13.2 kV underground power, rerouting of drainage, initial site clearing, clearing area for new security fencing, and parking lot construction. Every effort will be made during Title I and II to reduce building costs for this facility as well as increase the effective utilization of interior space.

9. Purpose, justification of need for, and scope of project

The objectives of this project are:

- To alleviate rapidly developing space limitations at the Central Computing Facility (CCF).
- To provide space for onsite switching for the Laboratory Telecommunications System, including its operation and maintenance.
- To improve the utilization of the Los Alamos National Laboratory (LANL) computing resources significantly by providing connectivity to these resources for the Laboratory staff requiring connections.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Laboratory Data Communications Center,
Los Alamos National Laboratory,
Los Alamos, New Mexico

2. Project No.: 86-D-106

9. Purpose, justification of need for, and scope of project (contd.)

o To provide a facility designed to accommodate computing and communications growth projected for the next decade.

The use of high-speed computers and mathematical models to simulate complex physical processes has been and continues to be the cornerstone of the weapons design program. State-of-the-art computing and data communications are essential for meeting national security program goals and commitments.

LANL is now approaching a crisis because the physical plant capacity to support computing and data communications equipment has been overextended. The LDCC is required to fill this need by providing space to house new supercomputers beginning in FY 1989.

Long-range plans have been structured to provide for growth in computer and data communications capability in phase with program requirements. At-present, 85 percent of computing resources are used for nuclear weapons and defense-related activities. These activities are now expanding because of major new advanced weapons design programs and a very rapid growth in strategic defense technology research, which will require significantly increased computing capability. The existing Central Computing Facility will soon have neither the space nor the supporting services, such as electric power and cooling, for the computing and data communications equipment that is planned to support program needs. The LDCC is urgently needed to provide this space and these services.

a. Major computer acquisitions planned for the time frame FY 1986 through FY 1991 include four Class VII and two Class VIII systems. Older, less capable machines--beginning with the Control Data 7600s--will be retired or relocated to other Department of Energy sites. However, by the end of FY 1988, all available space--including remaining office areas modified for computer use--will be completely occupied and continuation of the acquisition plan will not be possible. Additional space will be needed for the periodic upgrade of important ancillary equipment, such as the common data file system and the printing and graphics production system, to keep pace with the power of the computers. The LDCC is essential to provide that space.

b. It is through the data communications network that the Laboratory staff uses the computers. That use includes access to the machines to prepare programs, submit jobs, monitor work underway, interact with running programs, and edit output. The growing weapons program emphasis on computer-aided design and engineering involves transmission of great quantities of weapons product definition data between central computers and design workstations, and between Los Alamos and other weapons laboratories and production sites. The network transfers data files between the central data storage facilities and remotely located minicomputers and workstations. It transmits to the staff the results of computations, and it serves technical, administrative, and management personnel as the Laboratory's management information system. Without the space for data communications provided by the LDCC, the needed growth in this area beyond FY 1988 will not be possible.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Laboratory Data Communications Center,
Los Alamos National Laboratory,
Los Alamos, New Mexico

2. Project No.: 86-D-106

9. Purpose, justification of need for, and scope of project (contd.)

c. While data communications growth and enhancement are emphasized, the LDCC will also accommodate needed improvements in voice and video communications facilities. Reflecting technology trends and the modern approach to efficient and cost-effective communications, the Laboratory plans the implementation of an integrated communications network, including central switching, to encompass the various forms of information transmission. The new space provided by the LDCC is an essential element of these plans because space otherwise does not exist. The LDCC will be the operational center for the integrated telecommunications system and the directional center for its maintenance. Improved communications security will be afforded by location of the switching for the Laboratory telecommunication network inside a secure area. The existing switchgear is presently located in a facility in downtown Los Alamos.

d. Our projection is that the LDCC will satisfy the Laboratory's requirements for its intended functions through the year 2000.

10. Details of cost estimate

	Item Cost	Total Cost
a. Engineering, design, and inspection		$ 2,100
(1) Facilities at about 11 percent of construction costs less Item b.(4)	$ 1,650	
(2) Special facilities equipment at about 11 percent of Item b.(4)	450	
b. Construction costs		18,600
(1) Improvements to land, including site clearance, drainage, security fence, and LDCC parking lot	530	
(2) Building, approximately 90,000 square feet at about $148 per square foot (Data Communications Center)	13,330	
(3) Other structures (access tunnel and guard station)	140	
(4) Special facilities; computer electrical and cooling systems, computer-data cabling, and utility connections	4,010	
(5) Utilities, including power, cooling water supply and return, cooling towers	590	
c. Standard equipment, including elevators and laboratory benches		450
Subtotal		21,150
d. Contingencies at approximately 18 percent of above costs		3,850
Total project cost		$25,000

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Laboratory Data Communications Center,
Los Alamos National Laboratory,
Los Alamos, New Mexico

2. Project No.: 86-D-106

11. Method of performance

Design and inspection for the facilities will be performed under a negotiated architect-engineer contract. Some FY 1986 design/build and inspection will be performed by the operating contractor. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and contracts awarded on the basis of competitive bidding.

12. Funding schedule of project funding and related funding requirements

	Prior Years	FY 1986	FY 1987	FY 1988	Total
a. Total Project Funding					
(1) Total facility costs					
(a) Construction line item	$ 0	$ 500	$ 7,500	$17,000	$25,000
(b) Plant engineering and design	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0
(d) Inventories	0	0	0	0	0
Total facility costs	$ 0	$ 500	$ 7,500	$17,000	$25,000
(2) Other project funding					
(a) Conceptual design	200	0	0	0	200
(b) Other project related costs	0	0	0	0	0
Total other project funding	$ 0	$ 0	$ 0	$ 0	$ 200
Total project funding (items 1 and 2)	$ 200	$ 500	$ 7,500	$17,000	$25,200

b. Other related funding requirements (estimate life of project: 25 years)

(1) Facility operating costs	$ 1,170
(2) Capital equipment not related to construction but related to the programmatic effort in the facility	12,000
Total other related annual funding requirements	$13,170

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Laboratory Data Communications Center,
Los Alamos National Laboratory,
Los Alamos, New Mexico

2. Project No.: 86-D-106

13. Narrative explanation of total project funding and other related funding requriements

a. Total project funding
   (1) Total facility costs. No narrative is required.

   (2) Other project funding
      (a) Conceptual design expenses were necessary to establish the specific design and construction features. No research and development is necessary for this project.
      (b) Other project-related costs. No narrative is required.

b. Total related funding requirements
   (1) Facility operating costs
   The annual facility operating costs are estimated for FY 1989 as follows: 90,000 square feet at $13.01 per square foot (based on the 1984 Laboratory average of $1.43 for janitorial, $2.50 for maintenance, and $4.36 for utilities services escalated by cumulative rates of 37 percent, 37 percent, and 75 percent, respectively).

   (2) Capital equipment not related to construction but related to the programmatic effort in the facility
   An expenditure of $50,800,000 is planned for FY 1989 for lease and/or purchase of two Class VII supercomputers, CAD/CAM Interactive Graphics, and an output station upgrade (see LANL Major ADP leases and purchases). An average annual expenditure of $12,000,000 is planned for years beyond FY 1989.

Department of Energy
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

1. Title and location of project: [illegible]

2. Project No.: [illegible]

3. Date A-E work initiated: [illegible]

3a. Date physical construction starts: [illegible]

4. Date construction ends: [illegible]

5. Previous cost estimate: [illegible]

6. Current cost estimate: [illegible]

7. Financial schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Sequestered	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

8. Brief physical description of project

[illegible]

a/ [illegible]

b/ [illegible]

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations | 2. Project No.: [illegible]

4. Brief physical description of project (contd.)

Facilities will replace or add to existing facilities that are overaged, deteriorated, overcrowded, or are inadequate to meet the capabilities required for the current and future weapons research and development (R&D) program and to achieve a long-term balanced test program.

Nevada Operations Office, Las Vegas, Nevada

Aerial Measurements Operations Facility - Las Vegas (TEC $27,000,000; FY 1985 funding $2,000,000; FY 1986 funding $5,000,000; FY 1987 funding $20,000,000)
Construction starts: 1st Qtr. FY 1987 [1]; Construction ends: 4th Qtr. FY 1988

This subproject provides for a new Aerial Measurements Operations (AMO) facility. The proposed AMO facility will replace the existing facility located adjacent to McCarran Airport and will provide a 110,000-square-foot building, illuminated aircraft parking apron with treatment, taxiways, paved vehicle parking, and all required roads and utilities. The buildings will provide space for offices, light laboratories, mechanical and electronic assembly, computer operations, photograph processing, plant and maintenance, general storage and warehousing, and aircraft maintenance and operations. Currently, the specific site has been determined to be located at Nellis Air Force Base, Nevada. The location will meet the following requirements: a 24-hour operational tower, 24 hour security, night landing capability, instrument landing system or very high frequency omni range capability, and access to jet fuel storage. The runway will be of sufficient length and width to accommodate C-130 aircraft.

Vehicle parking area illumination will be sufficient to accommodate closed-circuit security television monitoring. Approximately 5,000 lineal feet of 8-foot high security fencing will be utilized around the perimeter to delineate certain critical areas. In addition, a personnel bridge for facility access and a hardened guard station will be required.

This facility is required to replace the existing facility located on [illegible] Road in Las Vegas, adjacent to McCarran Airport. The need for this replacement arises from three factors: expanded program requirements, the inadequacy of the existing space as related to operational and fire protection requirements, and the pending condemnation of the existing facility due to a planned new runway at McCarran International Airport.

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[1] [illegible] of Nellis Air Force Base.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations

2. Project No.: 85-D-102

8. Brief physical description of project (contd.)

Aside from the programmatic and fire safety considerations, the existing facility will be condemned because of the planned airport expansion. Considering the period required to relocate prior to land condemnation, coupled with the expectation that construction costs will continue to increase, it is prudent to construct new facilities as quickly as possible consistent with reasonable and efficient construction planning.

The total estimated cost (TEC) of this subproject increased $3,500,000 to $27,900,000 from $24,400,000 due to further definition of site-related construction requirements and the addition of the U.S. Army Corps of Engineers (USACE) as construction manager to the project team. The additional site-related construction requirements are the result of a study conducted by the Nellis Air Force Base Commander and the identification of new site location for this facility.

The FY 1987 funding request will be used to fund facility construction, procure equipment, and support subproject USACE construction management.

Test Facilities Revitalization, NTS and NLV

This subproject will initiate revitalization at the NTS and NLV in five major functional areas: (1) reconfigure Forward Area camps to replace existing substandard, overcrowded camps and to free up prime test real estate; (2) develop Pahute Mesa by providing some permanent facilities, utilities, and improved roads; (3) test execution support by upgrading facilities to accommodate larger diameter devices and canisters; (4) replace common support facilities such as fire houses, health facilities, warehouses, and craft shops; and (5) initiate an effort to expand and replace personnel support facilities such as housing, dining halls, and recreation facilities.

(1) Develop Pahute Mesa

The objective of this development plan calls for: (1) the paving of the two access roads; (2) establishment of permanent materials and equipment storage facilities; (3) establishment of decontamination and heavy equipment service facilities; (4) upgrading of power systems to support multiple events; and (5) installation of a permanent water system along with supporting industrial, fire protection, and domestic requirements.

a. Pahute Mesa Road System, NTS (TEC $10,100,000; FY 1985 funding $2,500,000; FY 1986 funding $0; FY 1987 funding $3,800,000; FY 1988 funding $3,000,000)
Construction starts: 2nd Qtr. FY 1986; Construction ends: 4th Qtr. FY 1988

This subproject provides for upgrading the existing Pahute Mesa Road System to form a transportation loop connecting Yucca Valley to Pahute Mesa. The western portion of the proposed loop will be developed by improving Road 18-03 from its intersection with Airport Road westerly 2.4 miles to Buckboard Mesa Road, and Buckboard Mesa

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations	2. Project No.: 85-D-102

8. Brief physical description of project (contd.)

Road from its intersection with Road 18-03 northerly 11.6 miles to Pahute Mesa Road. The eastern side of the loop will be completed by improving Pahute Mesa Road from its intersection with Buckboard Mesa Road in Area 20 southeasterly some 22 miles to its intersection with Stockade Wash Road. The project will involve building up, realigning, widening, paving, and stripping roads 18-03 and Buckboard Mesa. It will also entail realigning, resurfacing, and stripping Pahute Mesa Road. Initial construction will improve the northernmost five miles of Buckboard Mesa Road south of its intersection with Pahute Mesa Road.

The Pahute Mesa Road System provides access to Pahute Mesa Test Areas. An expanded weapons test program is planned to be conducted on the Mesa. Many sections of the existing paved miles are heavily potholed and washboarded and the rest is unpaved. These conditions make travel unsafe at speeds above 25 miles per hour. The deterioration and unpaved roads increase fuel consumption, raise vehicle maintenance costs, and require long lead times for equipment deliveries to event sites. An increased testing level on the Mesa will require the transportation of approximately 500 personnel daily, along with support vehicle and equipment traffic, which makes paving the Mesa Road system a critical project if the Mesa is to be a major test area.

The TEC of this subproject increased $300,000 from $9,800,000 to $10,100,000, as the result of escalation adjustments due to zero funding in FY 1986.

FY 1987 is the second year funding for a three-year phased approach to upgrading the Pahute Mesa Road system subproject.

(2) Test Execution Support

The objective of this development plan calls for: (1) upgrading facilities' capability and capacity to handle additional and larger devices and canisters; and (2) upgrading facilities used for equipment research and fabrication, calibration, installation, and monitoring to service the proposed balanced test program.

(a) ATLAS High Bay Expansion, NLV (TEC $2,700,000; FY 1985 funding $2,700,000; FY 1986 funding $0; FY 1987 funding $0)
Construction starts: 1st Qtr. FY 1986; Construction ends: 4th Qtr. FY 1986

This subproject will provide a 140-foot by 80-foot enclosed assembly area between the existing ATLAS facility and the proposed staging assembly tower. This high bay expansion will be constructed of precast concrete panels attached to a structural metal support system. It will have a variable eave height stepping upward from 31 feet to 74 feet in 11-foot increments. The facility will also be equipped with two 30-ton cranes to provide the capability to assemble the number of canisters necessary to support planned testing levels. The demands of the long-term balanced weapons program dictate an increase in size, complexity, and quantity of canisters, which will

CONSTRUCTION PROJECT DATASHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations

2. Project No.: 85-D-102

8. Brief physical description of project (contd.)

require an increase in the ATLAS high-bay facility floor space. This project will provide an addition to enlarge the facility by approximately 11,200 square feet.

The present high bay consists of approximately 23,000 square feet of floor space, 2,700 square feet of which are dedicated to canister assembly. The average canister section requires 700 to 800 square feet of open floor space during assembly. Under present conditions, only three canister section frames can be assembled or pre-aligned simultaneously. Two complex events, comprised of two canister sections each, cannot be assembled on the floor at the same time. Increased floor time requirements due to increased canister complexity tend to aggravate the situation. A continuing increase in the diagnostic complexity associated with an underground test requires each diagnostic canister to spend 30 to 40 percent more time on the high bay floor during assembly. In addition, the planned number of tests performed will require a significant increase in canister throughput. This subproject was fully funded with the FY 1985 appropriation.

(b) Diagnostic Assembly Tower - LANL, NTS (TEC $4,900,000; FY 1985 funding $4,900,000; FY 1986 funding $0; FY 1987 funding $0)
Construction starts: 1st Qtr. FY 1986; Construction ends: 1st Qtr. FY 1987

This subproject will provide a portable diagnostic assembly tower for LANL's use at NTS. The tower will be a 20-foot by 20-foot by 200-foot space truss tower composed of five 30-foot modules, one 27-foot module, and one 23-foot module. In addition, there will be an electric-driven rack and pinion passenger/freight elevator with a 6,000-pound capacity independent support mast and a 500,000-pound capacity hydraulic hoist for moving racks to the vertical position.

The tower will provide for the assembly and alignment of diagnostic test equipment which collects data on nuclear weapons tests and provides a weatherproof work area for technicians, hardware, and specialized electronics equipment. A fixed amount of time is required for this process for each event, and this additional tower will allow work to be carried on for several events simultaneously. In addition, this tower is required to provide the added capacity to execute a balanced test program, as well as to provide the required capability to support the 98-inch diameter by 165-foot long diagnostic rack and nuclear device and the associated heavier weights.

Current towers will not accommodate the canisters planned for use in the program. Further, an additional tower is needed to support the additional number of tests to be conducted on the Mesa.

This subproject was fully funded with the FY 1985 appropriation.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations

2. Project No.: 85-D-102

8. Brief physical description of project (contd.)

(3) Personnel Support Facilities

The objective of this development plan calls for upgrading the form of housing, dining halls, and recreation facilities; the plan's initial phasing calls for the construction of dormitories at Mercury and Area-12.

Dormitories - Mercury and Area 12, NTS (TEC $3,500,000; FY 1985 funding $3,500,000; FY 1986 funding $0; FY 1987 funding $0)
Construction starts: 1st Qtr. FY 1985; Construction ends: 1st Qtr. FY 1986

This subproject continues the dormitory replacement activities initiated in FY 1984 under Project 84-D-107, and in FY 1985 will provide for the construction of two Type "A" dormitories containing 53 single occupancy 12-foot by 20-foot rooms with individual restrooms and shower facilities in a 2-story building and the initiation of design of a type "C" dormitory which is the next planned replacement activity. The buildings will contain a lobby, laundry, mechanical equipment room, janitor's closet, and facilities for the handicapped.

These 106 units will replace a portion of the current 4-bed/shared bath trailers. The trailer units to be replaced have exceeded their use life by 200 percent, are in violation of DOE fire regulations, and do not provide appropriate or adequate accommodations for personnel are on temporary assignment to NTS or who must stay on location because of work schedules and operating procedures. The NTS users and contractors believe that adequate, comfortable housing affects the caliber of personnel they are able to attract and retain to work on the nuclear weapons test program.

Improved accommodations are required at the NTS to provide adequate living quarters for scientific and professional personnel who are required to reside at the NTS on a recurring semipermanent basis and also to provide adequate quarters for the permanent Mercury population. Existing housing at Mercury consists of: old trailers; wooden communal-type dormitories; concrete block bachelor officer's quarters; and two-story, motel-type dormitories. The acceptable bachelor officer's quarters and motel-type facilities will accommodate only 230 persons. During the first nine months of FY 1983, the average monthly peak overnight population was 800 persons. Thus, the monthly peak population exceeds by approximately 350 percent the space available in acceptable facilities. The peak population during an augmented test program is expected to be approximately 1,100 and will severely aggravate the situation.

During peak activity periods, housing scientific and technical personnel in Mercury has two advantages over accommodations in the nearest motels, which are 65 miles away in Las Vegas. First, motel accommodations in Las Vegas would represent a substantial cost to the Government. Second, the travel time (about 2-1/2 hours per

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations — 2. Project No.: 85-D-112

8. Brief physical description of project (contd.)

day) has a negative effect on efficiency and productivity, especially when these personnel are on extended workdays.

This subproject was fully funded with the FY 1985 appropriation.

(4) Test Revitalization Capital Equipment, NTS and NLV (TEC $2,400,000; FY 1985 funding $2,400,000; FY 1986 funding $0; FY 1987 funding $0)
Construction starts: 1st Qtr. FY 1985; Construction ends: 2nd Qtr. FY 1986

This subproject will revitalize the capital equipment base of the nuclear weapons test complex with primary emphasis on the Nevada Operations Office (NV) Test Complex. It will provide the necessary capabilities and capacities to support an increased level of testing. The types of equipment to be provided include: heavy construction, vehicles, communications, shop, data recording, timing and firing, nuclear chemistry, underground test measurement, laboratory, and other test diagnostics.

This project continues revitalization of the capital equipment base at NV which was initiated in FY 1984 under Project 84-D-107. Equipment needs at NTS and NLV are important and, in many cases, critical to achieving a balanced testing program.

The NV equipment requirements cover a broad spectrum of items which include sophisticated diagnostic recording, communications, heavy equipment, security, automated data processing, office, and the largest vehicle fleet in the Department of Energy (DOE). There are over 45,000 items included in this inventory which, for the most part, is spread over 1,350 square miles of the NTS. Much of the equipment is subject to the climatological extremes of the desert environment, as well as ground shock from nuclear underground tests. A high percentage of the equipment is moved frequently over unimproved roads and rough terrain. All of these factors combine to reduce the useful life of NTS equipment. From the viewpoint of the laboratories, the same degradation has occurred in their equipment resources.

Recent years have seen significant advance in technology which should be used in diagnosing the performance of nuclear weapon designs. The use of digital equipment, new television cameras, fiber optic techniques, radiochemical detectors, and improved equation-of-state measurements could provide the weapons designer with a larger fraction of the information which is needed to improve weapon design.

The equipment requirement needs also take into account the planned increased test rate and the need to support the increased rate under a long-term balanced advanced physics and weaponization test program.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: [illegible]

2. Brief physical description of project (cont'd):

[illegible]

a. [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations	2. Project No.: 85-D-102

8. Brief physical description of project (contd.)

b. Tritium Facility Upgrade, LLNL, Livermore, CA (TEC $4,700,000; FY 1985 funding $700,000; FY 1986 funding $2,500,000; FY 1987 funding $1,500,000)
Construction starts: 3rd Qtr. FY 1986; Construction ends: 1st Qtr. FY 1988

This subproject will provide a 1,000-square-foot building equipped with pumps, blowers, surge tanks, catalytic converters, and replaceable absorption beds to serve as a standby recovery system. Modern gas processing equipment will be installed in the adjacent gaseous chemistry building to reduce releases of radioactive gases and minimize releases during emergency situations. A vacuum effluent recovery system will be installed in the same building and a building addition of approximately 5,700 square feet and the remodeled area, approximately 2,000 square feet, will provide offices, a library, and space for other activities.

Mechanical utilities, power, and communications lines available at the existing building will be relocated as required to accommodate the proposed addition and alterations.

Safeguards and security considerations have placed a requirement to accommodate a rooftop hardened guardpost with this facility. Structural and utility interfaces will be added to this project while the actual guardpost and installation will be provided for in a safeguards and security line item project.

The purpose of this project is to provide safety and monitoring control of tritium systems and to reduce tritium releases to the environment to as low a level as reasonably practical. The existing once-through-airflow system was designed to protect building personnel from exposure, and small releases of tritium to the atmosphere were tolerated. Even though operations are currently within applicable safety regulations and guidelines, it is anticipated that regulations, environmental, and political concerns will require more stringent control systems for this facility. A vacuum recovery facility will recover small quantities of tritium that are now released in a controlled manner. A standby recovery system will protect against a large tritium release in the event of an equipment failure.

This tritium facility is used to provide for the continuing support of device tests at the Nevada Test Site, filling glass microsphere targets for inertial fusion experiments, and basic research in the physical and chemical properties of tritium containing hydrogen isotopes. Because of the vital functions this facility performs, these safety improvements must be made to assure the continued use of this facility.

The TEC for this subproject has increased $500,000, from $4,200,000 to $4,700,000, as the result of reestimating the subproject based on most current data, escalation adjustments due to reduced FY 1986 funding, the addition of structural/utility interfaces for the guardpost, and a minor increase in building costs associated with a 500-square-foot building space increase.

8. Brief physical description of project (contd.)

The FY 1987 funding provides for completion of the subproject.

Los Alamos National Laboratory (LANL), Los Alamos, New Mexico

Advanced Radiochemical Weapons Diagnostic Facility, LANL (TEC $7,900,000; FY 1985 funding $1,800,000; FY 1986 funding $5,000,000; FY 1987 funding $1,100,000)
Construction starts: 1st Qtr. FY 1986; Construction ends: 4th Qtr. FY 1987

The Radiochemical Diagnostics Laboratory will provide a 14,400-square-foot building west of the existing Radiochemistry Laboratory Building and will provide "clean" laboratory space for mass spectrometers isotope separator equipment, chemistry and standard chemistry laboratories, offices, stockroom, toilet/change rooms, and facilities equipment space. The laboratory space will include approximately 4,700 square feet of "clean" instrumentation space, approximately 2,300 square feet of "clean" chemistry space, and approximately 1,100 square feet of standard chemistry space. The laboratory support space of approximately 6,300 square feet will include office space, a stockroom, toilet/change rooms, data distribution room, air distribution systems space, and equipment room space to house extensive mechanical and electrical systems.

Present separators at LANL have neither the high-transmission efficiencies nor the large separation factors needed for state-of-the-art analyses. LANL's ability to respond either to the demands of a balanced test program or to provide the weapons designer with the maximum radiochemical data required for optimizing weapons design is, therefore, severely limited. Failure to provide this capability will severely limit the application of important diagnostic techniques in the analysis of the performance of nuclear weapons and will limit the weapons designer's ability to develop new designs.

This building and the new isotope separator equipment that is to be housed will revitalize the radiochemical weapons diagnostics program at LANL. Isotope separation of elements recovered from nuclear weapons debris has played an increasingly important role in the detailed analysis of device performance. This new facility will provide the opportunity for further expansion and development of the application of radiochemical detectors to the nuclear weapons program.

Radiochemical diagnostics have historically played a definitive role in the evaluation of weapons performance. The development of new radiochemical techniques, involving state-of-the-art mass spectrometric methods, has presented the laboratory with an opportunity to extend and improve its ability to diagnose and understand fully the performance of nuclear weapons tested underground in Nevada. This laboratory is for further expansion of this mass spectrometric capability leading to routine application to weapons diagnostics. The laboratory's "clean" facilities are an absolute necessity for the "mass spec detector" program. Delay in funding, or failure to fund, will delay or severely limit the application of important diagnostic techniques to the testing of nuclear weapons.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations

2. Project No.: 85-D-102

8. Brief physical description of project (contd.)

The TEC of this subproject has increased $100,000, from $7,800,000 to $7,900,000, due to escalation as the result of reduced funding in FY 1986 and inefficiencies associated with the scheduled extension.

The FY 1987 request will fully fund the subproject and allow its completion. This project has been rescoped due to construction contractor bids being in excess of the government estimates. The rescoping to stay within estimated cost includes the reduction of approximately 1,100 square feet of floor space

Sandia National Laboratories, Albuquerque, New Mexico, and Livermore, California

a. Weapons Laboratory Building, SNL, Livermore, CA (TEC $19,000,000; FY 1985 funding $5,800,000; FY 1986 funding $6,500,000; FY 1987 funding $6,700,000)
Construction starts: 3rd Qtr. FY 1985; Construction ends: 2nd Qtr. FY 1988

This subproject will provide a multistory general purpose laboratory building of approximately 77,000 square feet, consisting of light laboratory spaces, associated offices, and basement laboratory space plus equipment room. The project will include utility extensions and land improvements. This building will be a duplicate of the Safeguards Light Laboratory/Office building completed in FY 1980 in Albuquerque. The design has adapted the building to a new site, the structure has been modified for a different seismic zone, and the building entrances have been reworked. The equipment and support systems required to pursue state-of-the-art weapons R&D will be provided and will include special laboratory furniture and fume hoods, cooling systems for heat producing experiments and data equipment, environment containment and control systems such as chambers and glove boxes, and prefabricated clean rooms for dust-sensitive research. The building will also include a technical control center room to provide connections to the Sandia computing communications network. This center will be the focal point for all computer communications within this building and to the rest of the Sandia complex. Security alarms and physical protection systems will be installed and extended to the fire department and the security center.

SNLL requires a new laboratory building to correct a serious and growing deficiency in the site's facilities for weapons related research and weapons system development. This laboratory building will provide the facilities required for several applied research activities that have been at the forefront of weapon evolution: electronics, applied physics, and materials science. These activities will provide the technological basis for weapon improvements throughout the remainder of the century. Fundamental understanding of the involved phenomena and its application to mission oriented projects is the bedrock of the weapons program. It minimizes the possibility for technological surprise while creating new opportunities for United States systems--e.g., the components and structures for modern, small diameter devices for NATO artillery; providing weapons with some intelligence through use of microprocessors for improved operational capability, safety, and

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations

2. Project No.: 85-D-102

8. Brief physical description of project (contd.)

security; and the development of new materials for smaller and lighter systems which satisfy more stringent requirements. Providing modern state-of-the-art laboratories for these activities is vital for continued weapons development.

For the last 15 years, laboratory space at SNLL has been provided mainly by converting warehouse and office space into laboratories. Warehousing has been displaced to sheetmetal buildings. People have been moved from offices in permanent buildings to temporary substandard trailers and modulars. The result is that 30 percent of the weapons staff are in temporary quarters. Many are housed in overcrowded offices at scattered locations with poor services and inadequate utilities.

The acquisition and maintenance of temporary buildings and conversion of office and warehouse space to laboratories have been extremely costly. More importantly, because of limited adequate laboratory space, SNLL has not been able to evaluate adequately and apply critical processes which are needed for present and future weapon systems.

The TEC for this subproject has decreased $1,100,000 from $20,100,000 to $19,000,000 as the result of a favorable bid on a portion of the building construction.

The FY 1987 request will fully fund this subproject and allow completion of building construction, equipment procurements, and inspection.

b. Process Development Laboratory, SNL, Albuquerque, NM (TEC $21,100,000; FY 1985 funding $1,100,000; FY 1986 funding $6,700,000; FY 1987 funding $7,000,000; FY 1988 funding $6,300,000)
Construction starts: 4th Qtr. FY 1986; Construction ends: 1st Qtr. FY 1989

This subproject provides for the construction of a heavy laboratory and shop building of approximately 119,000 square feet gross area. Construction will include insulated metal panel exterior walls, concrete slab ongrade, steel stud-dry wall and demountable interior partitions and walls, poured-in-place concrete structural frame, and a lightweight steel roof structure with built-up roof. This laboratory shop and inspection area, approximately 77,000 square feet, will be a high-bay area. The office and common support area, approximately 77,000 square feet space, will be low bay. The basement and penthouse equipment room space is approximately 28,000 square feet. Beyond the typical heating, ventilation, and air conditioning and plumbing requirements will be special systems for gas handling and the exhausting of toxic materials and flammable gases.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations   2. Project No.: 85-D-102

8. Brief physical description of project (contd.)

The SNL main machine shop building and the welding/sheet metal foundry building are both more than 20 years old. Since the construction of these facilities, a number of specialty process activities have become a major part of SNL development functions. These activities (ceramics, plastics, physical electronics, process analysis, hybrid microcircuits, electronic fabrication, etc.) have continued to grow in importance and size due to new weapon systems requirements for increasing amounts of componentry utilizing these newer technologies. Inherent in these materials and process areas is the need for greater cleanliness, closer environmental control, and safeguards against potential physiological hazards.

In the absence of new buildings tailored to the job requirements, these functions have been crowded into the machine shop buildings and in temporary, substandard buildings that include metal Quonset and woodframe-type World War II era structures. This substandard space does not meet current fire codes and, after numerous modifications, is of questionable structural integrity. In these areas, necessary processes cannot be performed within acceptable environmental standards. These hazardous processes include: (1) the handling of lead containing ceramic powders; (2) amines and other suspected toxic plastic formulations; (3) hydrogen gas furnace operations; and (4) other processes requiring special environmental controls.

Providing adequate ventilation and effluent discharge for the required environmentally safe operating conditions would be impractical from a cost and functional requirements standpoint in many cases and physically impossible in some of the present processing facilities. Environmental requirements will be a prime consideration and an integral part of the new facilities basic design.

Without this new facility, several programmatic impacts can be identified: future weapons designs will be jeopardized by inadequate understanding of state-of-the-art manufacturing techniques and materials now becoming available to the production complex; SNL will be unable to specify complete product design definition to the production agencies for SNL designed components; already limited capability to "backup" production agencies will diminish further; capability for producing classified prototypes to support system and component development will erode further; environmental health concerns about heavy metals could require termination of the ceramics production activity, thereby eliminating a stockpile materials source; and additional process capabilities cannot be added without further safety degradations.

Based upon completion of Title I, preliminary design, the square footage of the building has been increased by approximately 16,000 square feet. This increased square footage is primarily the addition of an equipment penthouse which has been provided without an increase in the total estimated cost.

The FY 1987 request is required to continue funding of building construction initiated in FY 1986 and provide for long-lead procurements and inspection.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations	2. Project No.: 85-D-102

8. Brief physical description of project (contd.)

c. Shipping and Receiving Facility, SNL, Albuquerque, NM (TEC $2,750,000; FY 1985 funding $2,750,000; FY 1986 funding $0; FY 1987 funding $0)
Construction starts: 1st Qtr. FY 1985; Construction ends: 2nd Qtr. FY 1986

This subproject provides for the construction of a shipping and receiving facility of approximately 50,000 square feet area, the building will be constructed of pre-engineered steel column and beam (or truss) frames with a metal panel roof system. The building will have a minimum 18 feet interior clear height and will contain some interior offices to provide support to the warehouse function. Paving will consist of a parking lot, access roads, storage areas, loading docks, and truck access to the building. Utilities include gas, water, sewer, and electrical service to the new building from adjacent site service. The building will have an automatic sprinkler system, security lighting, intrusion alarm system, fencing, and a combination fire alarm and evauation alarm system.

The present facility assigned to the shipping and receiving functions and related activities contains only 17,750 square feet. Both the receiving and packaging-shipping activities, because of volume of activity, require large processing and staging areas. The confines and congestion of the present facility require moving and handling items several times. This not only decreases the efficiency, but increases the chance of damage or loss of the items. Because of the size and bulk of some items, it is necessary to utilize open storage for both the shipping and receiving operations. Both pedestrian and vehicular traffic in or around these items cannot be controlled at the present location.

An additional concern has been the recent location of new buildings and security area population relocation in this area. The entry gate to the security area located in that vicinity has always been a high traffic gate. As a result of the additional facilities that have been built or are being built in that location, this traffic has greatly increased. The traffic of commercial carriers and local suppliers adds to this congestion. This creates not only traffic congestion, but also concerns for safety. These drivers are uncleared, which amplifies the problem for security.

The new facility will allow the shipping and receiving and related functions to be relocated to expanded space and segregated to provide more intense security and protection, and will allow a smoother, more efficient flow of the property and material as it is being processed and stagged.

The following is a summary of the FY 1987 request by location:

Nevada Test Site and North Las Vegas ATLAS Facility, Nevada	$24,700
Los Alamos National Laboratory, New Mexico	1,100
Sandia National Laboratories, New Mexico and California	13,700
Lawrence Livermore National Laboratory, California	18,200
Total	$57,700

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations

2. Project No.: 85-D-102

9. Purpose, justification of need for, and scope of project

A decade of minimal construction and capital equipment funding for weapons RD&T has resulted in a stagnation and, in some cases, an erosion in the capabilities for the RD&T capital asset base. This project is the first phase in a multi-phased effort to revitalize the RD&T complex. The planning estimate for this effort over a ten- or eleven-year period is about $1,850,000,000 in escalated dollars, including line item construction subprojects, minor construction subprojects (less than $1,000,000), and capital equipment.

The nuclear weapons RD&T program is made up of a highly complex set of activities extremely dependent on current and advanced technology facilities and equipment to meet its varied needs. In turn, the successful performance of the RD&T program contributes directly to the quality and reliability of the nuclear weapons stockpile. New weapon systems now require, in addition to unremitting requirements for reliability and performance, new safety and safeguards features. These standards require innovative physics concepts and designs, the development of new materials and material applications, and extension of both engineering and manufacturing technologies beyond the current "state-of-the-art." Without providing the facilities and equipment necessary for this RD&T effort, the United States risks losing its superiority in nuclear weapons technologies.

Revitalization effort was initiated in FY 1984 with Project 84-D-107, Nuclear Testing Facilities Revitalization. That project was defined based upon needs identified in a test study completed in January 1982. The study was conducted by a task force comprised of representatives from the Office of Military Application, Nevada Operations Office, and the three weapons laboratories. All aspects of the test complex capital asset base were critically reviewed during the study and priority resource requirements necessary to achieve and sustain a balanced, long-term test program in excess of the FY 1981 level of testing were identified.

Several factors have contributed to the current situation as it relates to testing facilities. One such factor is the history of the overall test program itself. The history has been one of great fluctuations and very dynamic programs. These programs have fluctuated over the years due to political uncertainties and shifts in national policy relating to underground nuclear testing and nuclear deterrence. Many of the NTS facilities are temporary and were built 10-20 years ago and are now completely overage and deteriorated. Within the laboratories, capital funding for facilities dedicated to the test program has been sporadic at best. Many facilities now in use were built originally for other purposes. Another factor is the combination of increased complexity and workload confronting the program. To a large extent, the requirements for information in the test program mirror the pace and scope of the underlying research and development effort. As designs become more complex and the frontiers of technology are pushed out further in the laboratories, more information of increasing detail is required from each experiment associated with a device test. Today's device tests are much more complicated than tests conducted 10 years ago. Couple this with an overall increase in the DOE and work for others testing workload and it becomes obvious that additional diagnostic capacity and capability will be necessary at the NTS and the laboratories if the test program is to continue to support the research and development process in a timely and effective manner.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations

2. Project No.: 85-D-102

9. Purpose, justification of need for, and scope of project (contd.)

A similar study was made of the R&D capital asset base at the three nuclear weapons design laboratories and NV. This study identified the plant and capital equipment (P&CE) requirements necessary to support long-term R&D objectives and requirements for environmental, safety, and health; etc. This project, 85-D-102, reflects the results of that study and includes the remainder of the test revitalization program initiated in FY 1984 as Project 84-D-107.

The consolidation of the nuclear weapons RD&T revitalization needs into one project data sheet focuses the issue of the total needs of the RD&T program and is illustrative of the interdependence of the R&D and test programs to: (1) develop and apply nuclear weapons technology to maintain and improve current weapon systems, and (2) develop new weapons for the nuclear weapons stockpile in accordance with national security requirements.

10. Details of cost estimates a/

	Total cost
a. Engineering, design, and inspection	$152,300
b. Construction costs	
(1) Improvements to land	
(2) Buildings and building modifications	
(3) Special facilities	
(4) Utilities	
c. Standard equipment	
d. Removal cost less salvage	
e. Contingency	
Total estimated cost	$152,300

The estimates by location are as follows:

Nevada Test Site and North Las Vegas ATLAS Facility, Nevada	$ 51,500
Lawrence Livermore National Laboratory, California	50,050
Los Alamos National Laboratory, New Mexico	7,900
Sandia National Laboratories, New Mexico and California	42,850
Total	$152,300

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a/ Based upon completed conceptual design reports.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons research, development, and testing facilities revitalization, Phase I, various locations

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11. Method of performance

Design and procurement of the conventional facilities will be performed under negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 54,120	$51,700	$36,800	$ 9,680	$152,300
Total facility costs	54,120	51,700	36,800	9,680	152,300
2. Other project funding					
(a) Conceptual design costs	725	0	0	0	725
Total other project funding	725	0	0	0	725
Total project funding (items 1 & 2)	$ 54,845	$51,700	$36,800	$ 9,680	$153,025

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design costs

Conceptual design cost of $725,000 was necessary to develop a budget quality cost estimate and construction schedule.

(b) Other related funding requirements

The estimated programmatic life of these facilities varies by site and subproject.

The other related funding requirements for these facilities are not considered to be significantly different from those of the facilities and equipment being replaced by this project. Therefore, no costs are shown.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Safeguards and security enhancements, LLNL and SNL, Livermore, California	2. Project No.: 85-D-103
3. Date A-E work initiated: 1st Qtr. FY 1985	5. Previous cost estimate: $36,300 Date: 1/85
3a. Date physical construction starts: 1st Qtr. FY 1986	
4. Date construction ends: 4th Qtr. FY 1989	6. Current cost estimate: $41,100 Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$ 4,700	$ 4,700	$ 4,700	$ 2,528
1986	16,400	16,400	16,400	17,172
1986 Sequestered	(0)	(400)	(400)	(0)
1987	6,900	6,900	6,900	7,800
1988	13,100	13,500	13,500	8,800
1989	0	0	0	4,800

8. Brief physical description of project

This project provides for safeguards and security (S&S) enhancement of the Lawrence Livermore National Laboratory (LLNL) and the Sandia National Laboratories, Livermore, (SNLL) sites. This project covers three principal areas of construction and equipment: (1) the LLNL site, (2) the LLNL Site 300, and (3) the SNLL site. Facilities and equipment enhancements will be directed toward increasing features to delay intruders; improved intrusion detections, alarms, and access controls; upgraded communications/assessment capabilities; and improved special nuclear materials (SNM) accountability and control.

Physical security improvements will include replacement of outmoded alarm systems, additions to or upgrading of existing alarm systems, and new systems to enhance reporting and assessment of intrusion alarms. Closed circuit television (CCTV) surveillance systems and new fences will be installed consistent with the buffer land acquisition security plan.

The projects also provide for: (1) the construction of new hardened security and communication buildings, (2) the upgrading of security communication systems, and (3) improvements to the SNM accountability and control system.

The following briefly identifies the S&S enhancements to be initiated at the LLNL, LLNL Site 300, and SNLL sites.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements, LLNL and SNL, Livermore, California
2. Project No.: 85-D-103

8. Brief physical description of project (contd.)

a. LLNL, Livermore site

(1) Buffer zone security provisions

This work consists of fencing the new north and west buffer zone and the onsite east buffer zone; providing vehicle access and maintenance roads; and surveillance CCTV monitors with pan, tilt, and zoom capabilities.

(2) Security communications and control center addition

Construct a 3,700-square-foot addition to the basement communications area in the security building at Livermore. This project will house the controlled access by individual number (CAIN) computer and the secure interactive Livermore Alarm System (SILAS) computer, provide space for the emergency generators and uninterrupted power service in a hardened facility, and allow the communications console to expand and incorporate the new alarm and monitoring hardware.

(3) Controlled Access by Individual Number (CAIN) - Phase II

The new CAIN system will be developed to handle an enrollment capacity of 12,000 individuals, expandable to 18,000. Initially, the system will include 90 access booths which can be expanded to 500 access control points. A dual computer will be provided with applicable supplier-developed software where possible. Included in the system are dual central processing units (CPU) providing 100 percent backup, intermediate controllers serving as a buffer for information exchange between individual access points and the CPU, a television (TV) assessment subsystem to help resolve anomalies, and data link cryptographic protection. A gate logging and access control capability will be part of the CAIN system.

(4) Secure Interactive Livermore Alarm System (SILAS)

SILAS will provide an upgraded and expanded detection/alarm system of 280 channels expandable to 1,000 channels with interactive capabilities for classified and SNM areas. The system will include a computer, improved transmitter, receiver, and computer interface hardware, a TV assessment capability, and a geographic mapping alarm display.

(5) Integrated Security Control Consoles

This project will upgrade the present control and dispatch center by integrating security functions into a number of identical, graphics-oriented, processor-based control consoles. Each console will be capable of interacting with

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements, LLNL and SNL, Livermore, California

2. Project No.: 85-D-103

8. Brief physical description of project (contd.)

CAIN, SILAS, radio dispatch, TV assessment and surveillance, and other security systems. Two operating consoles (plus one standby) will be provided for the security control building.

(6) Upgrade security radio communications system

The following security radio backup facilities will be provided:

- VHF and UHF tone control base stations
- A microwave relay station between Livermore and Site 300.

These items include associated radio towers, antennas, cables, hardware, remote control units, battery powered backup units, cabling, power, and site work. Personal secure radio (hand-held) and associated base station units are also included in this category.

(7) Improve SNM accountability and control

Additional analytical equipment for the materials management group must be purchased to provide improved nondestructive evaluation. This includes a high level neutron coincidence detector and well counter and a new computer system.

b. LLNL, Site 300

(1) New security communications and control center, Site 300

Construct a new 11,500-square-foot security communications and control center at Site 300. The hardened basement (5,140 square feet) will include the alarm console, the emergency operations center, a communications equipment room, three offices, and the armory. Existing alarm and communication cable will be rerouted and reconnected. The first floor will house the squad room, exercise/training room, shift preparation room, conference room, toilets, locker and shower rooms, garage for emergency vehicles, electronic technician's shop, vending and kitchen, and three offices. Redundant units shall serve the alarm system such that no single failure will shut down the system.

(2) Secure Interactive Livermore Alarm System

This will provide an upgraded and expanded detection/alarm system of 100 channels expandable to 200 channels with interactive capabilities for Site 300 classified and SNM areas. The system will include a computer, improved

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements, LLNL and SNL, Livermore, California	2. Project No.: 85-D-103

8. Brief physical description of project (contd.)

transmitter, receiver, and computer interface hardware, and a geographic mapping alarm display. Two separate signals shall be sent from all critical alarms to the alarm console in the new security communication and control center.

(3) Integrated Security Control Console

This project will upgrade the present control and dispatch center by the addition of two computer-based, control consoles that will integrate the Site 300 Security functions including SILAS, TV Motion Detection and Surveillance, and radio dispatch. The consoles will be graphics-oriented and similar to the consoles at the Livermore site.

(4) Upgrade security radio communications system

The following security radio backup facilities will be provided:

- VHF and UHF tone control base stations.

These items include associated radio towers, antennas, cables, hardware, remote control units, battery powered backup units, cabling, power, a 150-square-foot building, and site work. Personal secure radio (hand-held) and associated base station units are also included at Site 300 in this category.

c. SNL, Livermore Site

(1) Perimeter intrusion alarm system

The buffer zone land to be acquired under a separate line item will be fenced at the perimeter and also at 500 feet (minimum) into the site to create a secure zone. Security access roads will be constructed in the buffer land around the perimeter of the site. To detect when perimeter security buffer zones have been penetrated, a CCTV motion detection system will be installed, along with redundant fence protection and ultrasonic and cable sensors. The CCTV motion detection system will also provide a constant surveillance of the buffer zone.

(2) New security operations and communications building

This portion of the project will afford a 9,400-square-foot security operations and communications building. The basement will be hardened and house the communications and control center and related operations for the new security system. A squad room, exercise/training room, shift preparation room, lockers, and showers will occupy the ground level.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements, LLNL and SNL, Livermore, California

2. Project No.: 85-D-103

8. Brief physical description of project (contd.)

(3) Upgrade security radio communication system

To protect internal security communications, the radio base stations, transceivers, towers, antennas, and other associated equipment will be expanded. Existing emergency external capabilities with LLNL and local law enforcement agencies will also be strengthened.

The total estimated cost (TEC) for this project has increase $4,800,000, from $36,300,000 to $41,100,000, due entirely to the LLNL portion of the project increasing from $31,800,000 to $36,600,000. The LLNL increase is the result of escalation adjustments due to reduced FY 1986 funding, reestimating the project costs, identification of required additional TV assessment capability for the secure alarm system and the integrated security control system, identification of required additional capacity for perimeter gate logging and control for the CAIN system, and a change in construction strategy for the Livermore site security communications and control center addition. Minor reductions of work and associated costs to be performed in the buffer zone have also been included in the current TEC.

The FY 1987 funding will be used to complete engineering and design for the LLNL SILAS and CAIN subprojects, complete construction and/or procurements on the control center facilities, SNM accountability, and communications subprojects.

9. Purpose, justification of need for, and scope of project

An effective S&S system is an aggregation of the protective mechanisms which contribute to the reduction of risks from the actions of an adversary. The threat spectrum considered for this project ranges from political demonstrators, who are relatively peaceful but may intrude into the laboratories to gain media attention and cause disruption, to antinuclear extremists and terrorists who intend to sabotage facilities and/or engage in the theft of SNM. The threats posed by disgruntled employees, who may act alone or in collusion with other employees, and/or external adversaries for the purpose of espionage or sabotage have also been factored into the scope of this project.

An assessment of the risks posed by this range of threats indicates the need for substantial improvements in the LLNL and SNLL physical protection systems. Existing safeguard alarms, detection assessment systems, and signal linkages are technically obsolete and need upgrading and/or replacement. These systems have grown to the point where they have reached capacity and utilized all available space in security facilities at SNLL, LLNL, and Site 300. Further, central equipment and consoles must be housed in a hardened facility to protect the heart of the security systems.

Differences in site-specific geographical characteristics of the LLNL and SNLL sites and the LLNL explosives testing site (Site-300) require differing approaches to improving the protection system. The needs for upgrading the elements of the S&S system for all three sites are described and justified in the following sections. The protection system elements that

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Safeguards and security enhancements, LLNL and SNL, Livermore, California	2. Project No.: 85-D-103

9. Purpose, justification of need for, and scope of project (contd.)

must be addressed include deterrent and delay measures; detection, alarms, and access controls; communications and assessment capabilities; and SNM accountability and controls.

a. LLNL, Site

(1) Buffer zone security provisions

The buffer land acquisition, various locations, project (83-D-199) was funded by Congress in FY 1984 with an initial appropriation of $7,000,000. House Report 98-124 stated that the acquisition of relatively small, strategically located parcels of land adjacent to certain weapons facilities would improve physical security and prevent potential damage or sabotage of buildings and equipment. Compared to the possible damages, this program is highly cost effective. Congress appropriated an additional $17,000,000 in FY 1985 for the buffer land acquisition project.

In support of the buffer land acquisition project and to provide an effective and visible deterrent and delay barrier to a potential intruder, the buffer zone must be provided with security measures such as fences, lighting, perimeter road, and CCTV surveillance system incorporating motion detection. These improvements are necessary to reduce the frequency of adversary actions through visible deterrence and, if such actions were attempted, reduce the probability by timely interdiction/interruption.

(2) Security communications and control center addition

The existing hardened basement of the security building must be expanded to provide space for the new CAIN and SILAS computer hardware, the new integrated consoles, and additional CCTV channels. The expansion will relieve overcrowded operating conditions, allow greater ease of equipment maintenance, and improve the equipment layout to reduce the high noise level now existing in the console operator/dispatcher area.

(3) Controlled Access by Individual Number (CAIN)

Personnel access control, a key factor in an effective S&S program, is normally a function of the guard force or electronic identification or a combination of these. The proposed upgrade and expansion of the 10-year-old (CAIN) system will provide LLNL with the ability to insure more reliable access control for authorized personnel to protected and material use areas containing SNM and/or classified information and minimize inconvenience and delay to LLNL personnel. It will also maximize the cost-effective use of protective service personnel by using a computer access system rather than manpower.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements, LLNL and SNL, Livermore, California

2. Project No.: 85-D-103

9. Purpose, justification of need for, and scope of project (contd.)

This upgraded CAIN system (Phase II) includes a new distributed computing system. It will provide an extremely reliable central system that will handle access authority files and recordkeeping. The central system will also oversee the security audit, assuring that users do not engage in improper transactions. Local microprocessors will handle the actual entry point security and aperture management details. Standard equipment will be used where possible to keep future support costs down. No known alternate technology is available which is capable of providing the necessary security, speed of operation, reliability, ease of management, and cost effectiveness of computer-based access control.

(4) Secure Interactive Livermore Alarm System (SILAS)

An upgraded and expanded detection/alarm system with interactive capability will provide LLNL's security department with a reliable system that allows immediate notification and coordinated control of all perimeter surveillance alarms and alarmed facilities in which classified parts, information, and SNM are stored. The proposed system will provide an enhanced identification system and increased computer capabilities.

Setting alarms in the "secure" or "access" mode in SNM areas and other storage facilities containing classified parts and/or material is presently a cumbersome, time-consuming, manual system. The proposed state-of-the-art system would provide new and significantly improved identification/control and reliability in the security network.

(5) Integrated Security Control Consoles

The purpose of this upgrade is to integrate the normal command and control functions of the LLNL security department into a single, efficient control mechanism. The new security consoles are intended to increase the reliability of the present hardware, expand the operators' ability to handle multiple tasks through computer graphics, shorten the response time required to assess and respond to anomalies through information processing by computer, efficiently interact with SILAS and CAIN II, and establish an effectual working environment for the operators.

(6) Upgrade security radio communications system

Security backup radio stations with associated towers and antennas are required at Livermore and a relay station between Livermore site and Site 300 to assure the availability of radio communications for the security department in emergency situations. Also, to reduce vulnerabilities, cables from the security control centers to the towers and equipment must be buried. Furthermore, hand-held secure radio units are necessary to provide prompt, secure communications between tactical security forces and the command/control center.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements, LLNL and SNL, Livermore, California	2. Project No.: 85-D-103

9. Purpose, justification of need for, and scope of project (contd.)

(7) Improve SNM accountability & control

On a continuous basis, the ability to determine accurately quantitatively and qualitatively SNM being received and shipped or internally transferred between material balance areas is often critical to resolving differences and assuring reliable inventory records. Additional measurement equipment is needed to upgrade LLNL's nondestructive analytical capability and a new computer to handle reports and track materials.

The existing computer now used by the accountability group is seven years old, is reaching obsolescence, and has a marginal capacity to handle adequately all existing accountability and material control activities.

b. LLNL, Site 300

(1) New security communications and control center, Site 300

The present security building at Site 300 is an old, lightweight structure in a vulnerable location near a public road. A new hardened security communications and control center is required for Site 300 to protect security's central communication and alarm system, provide for expansion as increased facility surveillance and alarms are added to this system, provide an adequate emergency operations center, and assure the protection of the security force. The new building will be sited away from the public road, reducing its vulnerability to adversary action. This building will also provide training facilities, an armory, and a secure garage for the armored patrol vehicles.

(2) Secure Interactive Livermore Alarm System (SILAS)

As is true at the Livermore site, an upgraded and expanded detection/alarm system with interactive capability is necessary to provide the Site 300 security department with a reliable system that allows immediate notification and coordinated control of all alarmed facilities in which classified parts, information, and SNM are stored. The proposed system will provide an enhanced identification system and new computer capabilities.

(3) Integrated Security Control Consoles

Two upgraded consoles will each integrate SILAS, TV motion detection, and radio dispatch into a computer-based control system. The consoles will be housed in the new Site 300 Communications and Control Centers and will provide a more effective and rapid response to emergencies and minimize future manpower requirements by providing operators with processor-based assessment capabilities and information.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Safeguards and security enhancements, LLNL and SNL, Livermore, California	2. Project No.: 85-D-103

9. Purpose, justification of need for, and scope of project (contd.)

(4) Upgrade security radio communications system

Security backup radio stations with associated towers and antennas are required at Site 300, as at the Livermore site, to assure the availability of radio communications for the security department in emergency situations. Hand-held secure radio units are also necessary to provide prompt secure communications between tactical security forces and the command/control center.

c. SNLL Site

(1) Perimeter intrusion alarm system

Acquisition of buffer zone property necessitates that additional intrusion alarm systems and security fencing be acquired to provide early detection and assessment of intruders. The perimeter security road would aid in both the patrol of the new buffer zone and apprehension of any intruders.

(2) Security operations and communications building

A new hardened security operations and communications building is required to protect security's central communication and alarm system nerve center. Recent vulnerability analyses and security surveys have emphasized the need to relocate critical security activities internal to the site, thus reducing their vulnerability. This building will also provide appropriate facilities for centralizing all guard force and physical security related activities as well as an emergency operations center.

(3) Upgrade security radio communication system

Upgrading of the radio communication system is required to provide communications secure from news reporters and others who continually monitor SNLL frequencies to gain information on patrol activity, emergencies in progress, routine communication which may divulge information to an adversary--such as arrival or departure of safe secure trailers, etc. The upgraded system will provide secure communication with LLNL and law enforcement agencies and will provide an increased level of duress reporting. SNLL began a minimal conversion to a secure radio system with digital voice protection in FY 1982-FY 1983 with the acquisition of a base station and five portable transceivers.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements, LLNL and SNL, Livermore, California	2. Project No.: 85-D-103

10. Details of cost estimates a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 15 percent of construction costs, item b		$ 3,450
b. Construction costs		23,420
(1) Improvements to land, including grading, paving, parking, fencing, and walks	$ 2,290	
(2) Security communications/control center - Site 300	1,700	
(3) Security communications/control center addition - Livermore site	805	
(4) Security communications/operations building - Sandia site	1,660	
(5) Utilities-mechanical, water, electrical power, communications, sewer, & area lighting	3,735	
(6) Special facilities including CAIN access control systems, interactive alarm system radio base stations	13,230	
c. Standard equipment includes SILAS and CAIN computer hardware, secure personal radios, surveillance TVs, accountability/material control computer		8,875
d. Removal cost, less salvage		25
Subtotal		35,770
e. Contingency at approximately 15 percent of above costs		5,330
Total estimated cost		$41,100

The estimates by location are as follows:

Lawrence Livermore National Laboratory, Livermore, California	$36,600
Sandia National Laboratories, Livermore, California	4,500
Total	$41,100

11. Method of performance

Design will be on the basis of a negotiated architect-engineer contract. Minor work and equipment procurement will be performed by LLNL and SNLL. To the extent feasible, construction and procurement will be accomplished by fixed-price contract awarded on the basis of competitive bidding.

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a/ Estimate based upon a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security enhancements, LLNL and SNL, Livermore, California	2. Project No.: 85-D-103

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$19,700	$ 7,800	$ 8,800	$ 4,800	$41,100
Total facility costs	19,700	7,800	8,800	4,800	41,100
2. Other project funding					
(a) Conceptual design costs	150	0	0	0	150
Total other project costs	150	0	0	0	150
Total project costs (items 1 and 2)	$19,850	$ 7,800	$ 8,800	$ 4,800	$41,250

b. Other related funding requirements (estimated life of project: 30 years)

1. Facility operating costs	$ 255
2. GPP or other construction related to programmatic effort in the facility	60
Total other related annual funding requirements	$ 315

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project costs

      (a) Conceptual design costs
      Approximately $150,000 was required to prepare a conceptual design, preliminary schedule, and cost estimate for this project.

b. Other related funding requirements
   1. Facility operating costs

   Facility operating costs of $255,000 are projected to cover the costs of maintenance and utilities for the project.

   2. GPP or other construction related to programmatic effort in the facility

   Initially, no GPP costs are anticipated but, to keep abreast of technology, presently undefined alterations estimated at $60,000, will likely be required in the future.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars)

1. Title and location of project: Hardened engineering test building, Lawrence Livermore National Laboratory (LLNL), Livermore, California

2. Project No.: 85-D-106

3. Date A-E work initiated: 2nd Qtr. FY 1985

3a. Date physical construction starts: 1st Qtr. FY 1986

4. Date construction ends: 2nd Qtr. FY 1987

5. Previous cost estimate: $2,700
Date: 1/85

6. Current cost estimate: $3,130
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$ 800	$ 800	$ 800	$ 270
1986	1,900	1,900	1,900	2,330
1986 Sequestered	(0)	(100)	(100)	(0)
1987	430	430	430	430
1988	0	100	100	100

8. Brief physical description of project

This project will provide a hardened, reinforced concrete test facility consisting of a single-story element with two 31-foot-high test bays, a control room, an office/conference room, and support space comprising of approximately 6,300 square feet. In addition, there are two 1,800-square-foot areas over a portion of the single-story element which will provide the space for the intrinsic radiation control room, the mechanical and electrical equipment, air filter system, and other service requirements. This facility will also have a detection system compatible with the site's security system.

One test bay will house the intrinsic radiation (INRAD) activity presently conducted in an existing high bay building; the other will house engineering test equipment such as shakers, hyges, thermal chambers, and impact testers. Each bay will be equipped with a 5-ton crane, high efficiency particulate air (HEPA) filter system, and LN_2 system. The building will be a hardened facility with vault or severe service doors, appropriate alarms, and located within an exclusion area.

Existing mechanical utilities will be relocated to clear the site and service the building along with nearby electrical and communication utilities. An automatic fire sprinkler system will be installed and normal building heating and cooling systems, with due regard to energy conservation, will be provided. Minimal land improvements will include service yard paving and fencing.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Hardened engineering test building, Lawrence Livermore National Laboratory (LLNL), Livermore, California

2. Project No.: 85-D-106

8. Brief physical description of project (contd.)

Safeguards and security considerations have placed a requirement to accommodate a rooftop hardened guard post with this facility. Structural and utility interfaces are included in this project while the actual guard post and installation will be provided for in a safeguards and security line item project.

The total estimated cost of the project has increased $430,000, from $2,700,000 to $3,130,000, as a result of reestimating the project and the addition of safeguards and security features into the project which are integral to the master plan of the exclusion area.

The FY 1987 funding will fully fund and permit completion of the project.

9. Purpose, justification of need for, and scope of project

Safeguards and security vulnerability reviews have resulted in the way INRAD measurements and engineering tests of special nuclear materials nuclear explosive-like assemblies (SNM NELA's) will be conducted at LLNL. As a result of safeguards and security concerns, a decision has been made to reduce the number of SNM NELA engineering tests at Site 300 to a minimum and to move the INRAD facility out of the currently occupied high bay building.

The reduction in effort at Site 300 is due to vulnerability reviews and the ability to defend SNM there. Rather than incur large costs for hardening facilities and staffing the security force, most SNM NELA engineering tests will, in the future, be conducted at the Livermore site. No existing building meets the requirements for space and security; therefore, a new structure is needed for engineering tests. SNM NELA engineering tests at Site 300 will be kept to a minimum until a new building is available at the Livermore site.

The INRAD facility also must be relocated for similar security reasons. The current location is unacceptable, both for softness of the structure and for its proximity to the perimeter fence.

The new facility will be located adjacent to plutonium and tritium facilities and within their exclusion area. This area is being upgraded to a protected area for SNM. This facility will include protective mechanisms including an exterior surveillance system to reduce the threat of adversary actions aimed at espionage, sabotage, or theft of SNM. Continuance of both the SNM NELA engineering tests and the INRAD activity is a programmatic necessity. A new hardened facility which meets safeguards and security requirements is urgently needed.

This building occupies an optimum location for a hardened guard post. Integrating structural and utility provisions with this project minimizes total eventual costs, avoids extensive rework, and minimizes vulnerability of the subject hardened guard

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Hardened engineering test building, Lawrence Livermore National Laboratory (LLNL), Livermore, California

2. Project No.: 85-D-106

9. Purpose, justification of need for, and scope of project (contd.)

post. The additional expense to this project is further justified since this facility shares safeguards and security interests with other programs function within the secure island.

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 21 percent of construction costs, item b		$ 430
(1) Titles I & II	$ 280	
(2) Title III	150	
b. Construction costs		2,280
(1) Improvements to land, including grading, paving, walks, and landscaping	40	
(2) Building - approximately 9,900 square feet at about $195 per square foot	1,930	
(3) Special facilities - safeguards equipment	70	
(4) Utilities, including mechanical utilities, sanitary and storm sewers, electrical power, communications, and area lighting	240	
c. Relocate existing equipment		80
Subtotal		$2,790
d. Contingency at approximately 12 percent of above costs		340
Total estimated cost		$3,130

11. Method of performance

Design will be accomplished on the basis of a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding. Minor architect-engineer work, site preparation, and activation will be performed by LLNL.

12. Funding schedule of project funding and other related funding requirements

Not applicable.

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Hardened engineering test building,
Lawrence Livermore National Laboratory (LLNL),
Livermore, California

2. Project No.: 85-D-106

13. Narrative explanation of total project funding and related funding requirements

Not applicable.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Radiation-hardened integrated circuit laboratory, Sandia National Laboratories (SNL), Albuquerque, New Mexico	2. Project No.: 84-D-102
3. Date A-E work initiated: 2nd Qtr. FY 1984	5. Previous Cost Estimate: $40,500 Date: 1/85
3a. Date physical construction starts: 2nd Qtr. FY 1985	6. Current cost estimate: $40,500 Date: 9/85
4. Date construction ends: 2nd Qtr. FY 1987	

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 2,000	$ 2,000	$ 2,000	$ 869
1985	20,000	20,000	20,000	1,178
1986	15,500	15,500	15,500	21,753
1987	3,000	3,000	3,000	16,700

8. Brief physical description of project

This project provides for the construction of a two-story laboratory building of approximately 174,000 square feet including a water chiller plant of about 6,000 square feet. The laboratory building will have approximately 38,000 square feet of heavy laboratory of which approximately 12,000 square feet will be a completely flexible class 10 at 0.10 microns clean room area. Within this class 10 clean room, local regions will be operated at class 1 cleanliness level. In these regions, vibration must be minimized, and both temperature and humidity will be precisely controlled (± 1/2° fahrenheit, ± 2.5 percent relative humidity). The heavy laboratory utilities area (72,000 square feet) will primarily be equipment rooms containing the clean room's specialized heating, ventilating, air-conditioning, and utilities requirements; the balance of the building, about 63,000 square feet, will be light laboratory offices, restrooms, and corridors to support the Sandia radiation-hardened integrated circuit laboratory.

The FY 1987 funding requested provides for the completion of the project and will fully fund the project.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radiation-hardened integrated circuit laboratory, Sandia National Laboratories (SNL), Albuquerque, New Mexico

2. Project No.: 84-D-102

9. Purpose, justification of need for, and scope of project

In 1974, SNL and the Department of Energy (DOE) decided to build the present radiation-hardened integrated circuit laboratory by modifying and adding on to existing buildings, both to develop new radiation-hardened integrated circuit designs and technology and to provide a backup production source in the event the American semiconductor industry could not satisfy DOE production needs.

This facility has been very successful in allowing Sandia systems to utilize the latest large-scale integrated (LSI) circuits in weapon systems designs. The W78, W81, W82, B83, W84, and B61-7 all utilize integrated circuits (IC's) which are designed and produced by the Sandia radiation-hardened integrated circuit laboratory. Although industry is supplying almost all of the large-scale integrated circuit needs on these programs, there are specific cases where the Sandia facility is either the sole source or the planned source for a very small, critical fraction of the production because American industry cannot or will not produce these complex, radiation-hardened parts. Work continues to transfer production to industry where possible, but it is recognized that in-house production is essential to allow weapon systems to make effective use of large-scale integrated circuits.

The component deliveries from the Sandia facility have increased rapidly. In 1980, only a few hundred units were supplied to the production plant in Kansas City, Missouri. In 1981, approximately 5,000 good chips and packaged IC's were provided to the Kansas City Plant. The 1982 orders exceeded 60,000 units. The present LSI clean room facility will be required to support DOE large-scale integrated circuit production requirements for the next decade, and the responsibility for the production of current weapon IC's is in the second of a three-year program to transfer it to the Bendix Corporation.

The present facility at SNL is adequate to meet these production needs for the next five years. Where inadequacies surface, they can be addressed by modifying or supplementing present facilities. However, the next generation very large-scale integrated (VLSI) technologies, which will be required by Sandia systems, place environmental demands on the present facility that cannot be met. It is clear that VLSI technology, if available with adequate reliability and radiation-hardness, offers one key to improve weapon performance, command and control, and safety and security through increased weapon "intelligence."

The proposed radiation-hardened integrated circuit laboratory is an R&D facility, not designed for production, and it provides for a very large-scale integrated circuit quality clean room to match the requirements of the 1990's technologies we will be needing. In this facility, the vibration level, air and water cleanliness, humidity, and temperature must be controlled to a greater degree than is possible in the present facility.

Success in very large-scale integrated circuits also requires a greater degree of interaction between designer, technologist, and fabricator than required by present large-scale integrated circuits, since very-large scale integrated circuits work closer to basic material and device limits. Thus, the new building has been designed to pull together much of the very large-scale integrated circuit staff into a single building.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radiation-Hardened Integrated Circuit Laboratory,
Sandia National Laboratories (SNL), Albuquerque, New Mexico

2. Project No.: [illegible]

9. Purpose, justification of need for, and scope of project (contd.)

Without this new facility, it will be virtually impossible for DOE to develop and utilize radiation-hardened VLSI in systems of the 1990's.

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at about 11 percent of construction costs, item b		$ 2,700
b. Construction costs		24,500
(1) Improvements to land, including grading, excavations, landscaping, paving, and roads	$ 400	
(2) Building - approximately 174,000 square feet at about $121 per square foot	21,100	
(3) Utilities	3,000	
c. Standard equipment		11,200
(1) New equipment (lithography, etching, implantation, etc.)	8,000	
(2) Relocate existing equipment	3,100	
(3) Emergency generator	100	
Subtotal		38,400
d. Contingency at approximately 5 percent of above costs		2,000
Total estimated cost		$40,400

11. Method of performance

Building design and inspection will be performed under a negotiated architect-engineer contract. Equipment design will be performed by SNL personnel. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

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a/ Based upon Title II design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radiation-Hardened Integrated Circuit Laboratory, Sandia National Laboratories (SNL), Albuquerque, New Mexico

2. Project No.: 84-D-102

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	Total
a. Total project funding			
1. Total facility costs			
(a) Construction line item	$23,800	$16,700	$40,500
Total facility costs	23,800	$16,700	$40,500
2. Other project funding			
(a) Conceptual design costs	30	0	30
Total other project funding	$ 30	$ 0	$ 30
Total project funding (Items 1 and 2)	$23,830	$16,700	$40,530

b. Other related funding requirements (estimated life of project: 50 years)	
1. Facility operating costs	$ 500
2. Programmatic operating expenses directly related to the facility	25,000
Total other related annual funding requirements	$25,500

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
  1. Other project funding
    (a) Conceptual design costs

A conceptual design was prepared for this project at a cost of $30,000.

b. Other related funding requirements
  1. Facility operating costs

Costs of unrecoverable materials and expenses used during operating and maintenance activities. Includes chemicals, gases, lubricants, waste disposal, and maintenance of steam and condensate lines.

  2. Programmatic operating expenses directly related to the facility

The operation and maintenance staff requirements include approximately 250 persons at $100,000 per year per person.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Simulation technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 82-D-144

3. Date A-E work initiated: 4th Qtr. FY 1982

3a. Date physical construction starts: 4th Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: $40,000
Date: 1/85

6. Current cost estimate: $40,000
Date: 9/85

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 1,200	$ 1,200	$ 1,200	$ 33
1983	3,000 a/	3,000 a/	2,998 a/	1,156
1984	8,000	8,000	8,002	3,473
1985	11,500	11,500	11,500	5,138
1986	10,300	10,300	10,300	13,800
1987	6,000	6,000	6,000	10,500
1988	0	0	0	5,900

8. Brief physical description of project

This project provides for the construction of one accelerator, Hermes III; the modification of an existing accelerator, Particle Beam Fusion Accelerator-I (PBFA-I); the necessary laboratory space for housing the Hermes III accelerator and other existing accelerators to be moved to the Simulation Technology Laboratory (STL); a control room; and the supporting diagnostics and data acquisition systems. Also included is laboratory space for experiments associated with utilization of the accelerators. The laboratory building consists of approximately 54,900 square feet--42,200 square feet of high bay/low-bay laboratory, and 12,700 square feet of light laboratory/office space. Utilities, including water, sewer, underground power, and natural gas, will be extended from existing nearby utility systems.

The building will be constructed of prestressed, precast concrete wall and roof panels with integral wall insulation. Portions of the building below grade will be cast-in-place concrete. Special systems for storage, transfer, and processing of deionized water and transformer oil will be provided.

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a/ Based on Continuing Resolution, Public Law 97-377.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Simulation technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico	2. Project No.: 82-D-144

8. Brief physical description of project (contd.)

Hermes III will be an advanced gamma-ray simulator which will run at higher voltages, higher currents, and shorter pulses than the existing Hermes II accelerator. A factor of 10 in increased performance, coupled with increased exposure area, will allow testing of subsystems and systems which cannot be tested at Hermes II. The modified PBFA-I accelerator will be an advanced x-ray simulator which will provide higher fluences for larger area exposures and improved spectrum compared to existing x-ray sources such as Rehyd, Hydra, and Proto II. The modified PBFA-I will allow x-ray testing that is currently needed, but not now possible.

The FY 1987 funding will fully fund the project and allow its completion.

9. Purpose, justification of need for, and scope of project

In order to develop simulation testing capabilities and apply them to the conduct of weapon effects tests on a timely basis, facilities dedicated to such uses are required. The simulation sources to be associated with the STL will be major improvements over the gamma-ray and x-ray laboratory sources that are presently available. They will, in many instances, have capabilities which match or are superior to the capabilities of underground testing. For example, the new radiation sources in STL will possess a better match to vulnerability requirements of dose, dose rate, pulse width, and spectral character than is presently available. Exposure areas available for testing will satisfy most agency requirements. In addition to weapons effects testing, the simulation sources will be available for use in future weapon system development and stockpile evaluation programs.

Justification for the STL rests on the fact that future United States nuclear weapon systems such as the PEACEKEEPER and TRIDENT II will require new laboratory radiation facilities for vulnerability, hardening, and survivability testing. Existing laboratory simulation facilities simply cannot provide the necessary output levels over adequate exposure areas and volumes. Furthermore, existing facilities cannot address vulnerability problems associated with potential new defensive weapons such as directed energy devices. In the event of a comprehensive test ban treaty (CTB), these sources would be vital to the maintenance of a viable weapon system development program and the associated strong defense posture.

Directed energy weapons, using particle beams or lasers, offer great promise. High-intensity particle beams and radiation fields are central to these schemes. STL facilities will offer means for studying the propagation of high-intensity particle beams and the physics of x-ray lasing. The energy densities needed for such studies are now available only in underground nuclear tests. Experimental study of the physics of these phenomena, to the extent possible in STL, would be less expensive and more efficient than through underground nuclear tests.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Simulation technology laboratory,
Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 82-D-144

9. Purpose, justification of need for, and scope of project (contd.)

A dedicated simulation facility with vastly improved capabilities is possible because of recent advances in Sandia's Pulsed Power Program and increased understanding of electron beam transport physics. The STL would contain Hermes III, an advanced gamma-ray simulator. Hermes III is projected to be capable of delivering up to 0.6 million joules of e-beam energy in a single pulse to a bremsstrahlung converter target. A modified PBFA-I will be capable of delivering up to 0.5 million joules of energy to x-ray producing targets in a single pulse.

If STL were not constructed, essential radiation effects testing activities associated with development and hardness assurance of future weapon systems would be impacted. Existing sources such as Hermes II would have to continue to be utilized for testing. This source is more than 10 years old, is experiencing serious operational problems because of age, and should be replaced. While the existing simulation sources have made significant contributions to the development of many United States weapon systems, they have not adequately matched important threat environmental characteristics that generate dose-rate-dependent radiation effects. The new advances in pulse power technology will make it possible to improve substantially this match and to achieve higher exposure levels over larger areas that will be required for testing of future systems.

The increase in the total estimated cost reflects adjustments made as the result of extending the completion date and funding requirements one year.

10. Details of cost estimate

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 25 percent of construction costs		$ 6,570
b. Construction costs		24,180
(1) Improvements to land, including grading, paving, and fencing	$ 70	
(2) Building, approximately 54,900 square feet at about $155 per square foot	8,040	
(3) Special facilities, Hermes III and modifications to PBFA-I	15,350	
(4) Utilities, including mechanical utilities, sanitary and storm sewers, and electrical power .	720	
c. Standard equipment (office and laboratory)		3,650
Subtotal		$34,400
d. Contingency at approximately 16 percent of above costs		5,600
Total estimated cost		$40,000

11. Method of performance

Design and inspection of the building will be on the basis of a negotiated fixed-fee contract. Construction will be by fixed-price contract awarded on the basis of competitive bids. Sandia National Laboratories will design, procure, and install the accelerator and instrumentation components.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Simulation technology laboratory,
Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 82-D-144

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$23,600	$10,500	$ 5,900	$40,000
Total facility costs	23,600	10,500	5,900	40,000
2. Other project funding				
(a) Conceptual design	30	0	0	30
(b) Other project related funding	12,550	800	0	13,350
Total other project funding	12,580	800	0	13,380
Total project funding (items 1 and 2)	$36,180	$11,300	$ 5,900	$53,380

b. Other related funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ 340
2. Programmatic operating expenses directly related to the facility	6,000
3. Capital equipment not related to construction but related to the programmatic effort in the facility	500
4. GPP or other construction related to programmatic effort in the facility	450
Total other related funding requirements	$ 7,290

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding

(a) Conceptual design was prepared by an architect-engineer firm at a cost of $30,240.

(b) Research and development effort related to development of the accelerators at a cost of $13,350,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Simulation technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 82-D-144

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be 20 years.

1. Facility operating costs

   Utility, janitorial, and maintenance costs estimated at approximately $8 per square foot annually.

2. Programmatic operating expenses directly related to the facility

   Salaries and supplies for approximately 60 people estimated at $100,000 per person, per year.

3. Capital equipment not related to construction but related to the programmatic effort in the facility

   Equipment requirements estimated to maintain the annual programmatic effort. No installations of new programmatic-related capital equipment are anticipated.

4. GPP or other construction related to programmatic effort in the facility

   Construction requirements estimated to maintain the annual programmatic effort.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars)

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1. Title and location of project: Combined device assembly facility, Nevada Test Site, Nevada

2. Project No.: 85-D-105

3. Date A-E work initiated: 1st Qtr. FY 1985

5. Previous cost estimate: $75,000
Date: 1/85

3a. Date physical construction starts: 3rd Qtr. FY 1986

6. Current cost estimate: $80,300
Date: 1/86

4. Date construction ends: 1st Qtr. FY 1990

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7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$ 5,000	5,000	$ 5,000	$ 1,700
1986	7,000	7,000	7,000	8,271
1987	18,000	18,000	18,000	15,200
1988	35,000	35,000	35,000	35,100
1989	15,300	15,300	15,300	20,000
1990	0	0	0	800

8. Brief physical description of project

This project will provide a new multistructure, nuclear combined device assembly facility (CDAF) containing approximately 100,000 gross square feet of floor space within a 22 acre, high security exclusion area in the central portion of the Nevada Test Site (NTS). The CDAF provides modern facilities for the consolidation of all Department of Energy (DOE) nuclear test device assembly functions and a capability for the disassembly of damaged or disabled nuclear weapons.

Included in the assembly/disassembly operational facilities are five containment cell (Gravel Gertie) structures, three assembly bays, one storage bay, four high bays, two radiographic facilities, four high explosive/special nuclear material (HE/SNM) storage bunkers, two HE storage magazines, one pit processing laboratory, connecting corridors, one administrative office area, mechanical/electrical support areas, and two storage buildings. All of the above structures except the main mechanical/electrical support building are surrounded or overlain by an earthen berm. All assembly/disassembly facilities will be provided with fire protection and detection systems and radiological floor drains connected to an isolated sump and decontamination system.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Combined device assembly facility, Nevada Test Site, Nevada	2. Project No.: 85-D-105

6. Brief physical description of project (cont'd.)

Principal security features of the entire complex are two elevated hardened guard towers; a hardened guard complex; one hardened, earthen bermed primary alarm station and one hardened earthen bermed secondary alarm station; and 4,300 linear feet of 8-foot high parallel chain line, perimeter fences with associated perimeter intrusion alarms, lighting, and video assessment. Each cell, bay, bunker, or any other areas that could contain special nuclear material (SNM) will have interior security alarms, and video assessment. The entire complex will also be protected with an aircraft early detection system and a helicopter landing avoidance system.

Primary utilities include a 3,750 kVA electrical substation, one-third mile of 34.5 KV underground power transmission line, two miles of 12-inch water line with one 250,000-gallon water storage tank, and a self-supporting sewage collection and treatment system. Utilities and other support systems' capacities will be sufficient to accommodate future expansion.

Major improvements to the land are about 22 acres of site grading and drainage diversion, 115,000 square yards of paving within the complex, and one mile of 25-foot wide paved access road with 10-foot wide graded shoulders. Major standard equipment items are one linear accelerator and 23 overhead cranes.

Further descriptions of the primary buildings and structures mentioned above are as follows:

The "Gravel Gertie" assembly facilities are positioned with access to a north-south aligned interior corridor. Each Gravel Gertie includes a circular work area 38 feet in diameter with overhead bridge cranes, associated support structures including air-locked access vestibules, decontamination facilities, and mechanical and electrical support buildings. The circular assembly structures have 12-inch-thick concrete walls and a catenary roof structure overlain with 25 feet of well-graded gravel. The air-locked access vestibules will be equipped with a double set of blast doors for equipment and personnel access. Mechanical and electrical equipment will be located in the main support building and the second floor corridor.

Three assembly bays will be erected with two openings into an interior corridor and one into an exterior corridor. Each bay (30 feet by 40 feet overall with 20 feet by 28 feet working space) will have 18-inch-thick concrete walls, a 75-ton bridge crane, 20-foot-high ceilings with separate personnel and equipment access air locks, and double blast doors. The storage bay will be 20 by 30 feet, identical to a small HE/SNM bunker, with a 20 foot clear height. These facilities will be earth bermed and overlain with earth fill.

Two radiography buildings are located with access to the interior corridor. The radiography complex will include a 1,216-square-foot linear accelerator (LINAC) bay fitted with air-locked access corridors, blast doors, and supporting facilities comprised of a control room, service area, dark room, and radiography room. The LINAC bay with 24-inch-thick

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1. Title and location of project: Combined device assembly facility, Nevada Test Site, Nevada

2. Project No.: 85-D-105

8. Brief physical description of project (contd.)

concrete walls will be bermed with 13 feet of sand to prevent radiation bleed-through. The walls of the supporting facilities will be 18 inches thick. The LINAC facilities will include vacuum, compressed air, and individual heating and cooling controls, and each will contain a 10-ton bridge crane.

Four 30- by 60- by 25-foot high bays to support test device assembly operations will be provided. A high bay will typically have 18-inch-thick concrete walls and blast doors opening into a 16-foot-wide by 16-foot-high corridor. One of the high bays will be equipped with a 16 by 16-square-foot roof hatch and corresponding floor pit. Explosion-proof electrical fixtures and a 15-ton bridge crane are included. Space for controls for gas pressure testing will be provided in an assembly bay.

A 60- by 30- by 12-foot high processing laboratory of reinforced concrete and bermed construction will provide space for device pit instrumentation and testing similar to device gas pressure testing. A small day vault within this laboratory will serve for temporary storage of the nuclear material components of test devices.

The proposed facility will include one 60- by 30-foot device storage bunkers, two 25- by 36-foot magazines for high-explosives, one vault for SNM, one vault for Class C explosives storage, and two decontamination/rest rooms. It will also include three 30- by 30-foot HE/SNM bunkers. The 25- by 36-foot structures will be steel arch construction. The remaining structures will be constructed with reinforced concrete walls. All structures will have bullet-resistant doors and explosion-proof electrical fixtures.

The combined administrative support offices for the device assembly function will be within a single concrete structure containing approximately 7,000 gross square feet of floor space.

All the operational structures are accessed off a connecting corridor which is rectangular in plan. The corridor is of reinforced concrete construction with two levels, each 18 feet wide. The combined length of the various corridor sections is about 1,370 feet. The one exposed corridor wall has emergency personnel doors and vehicle doors both of hardened construction. The first level is 16 feet high and provided with independent hearing, cooling, ventilation, fire suppression systems, and compressed air supplies. Compressed air conduits will include access points spaced at 50-foot intervals along the corridors to support air pallet operations. The second-level corridors will be a minimum of 12 feet high to accommodate the HVAC systems, duct work, filters, and electrical equipment.

Two reinforced concrete buildings each approximately 2,000 square feet will be erected, one at each side of the administration building. These structures will be used to receive and ship test device components.

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1. Title and location of project: Combined device assembly facility,
Nevada Test Site, Nevada

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8. Brief physical description of project (contd.)

A 140- by 40-foot preengineered metal mechanical/electrical support building will be constructed outside the parallel chain link fence but within a single chain link connecting fence. This building will house the central plants for heating/cooling systems and electrical switch gear.

An entry guard complex will be provided to control access to the DAF and the mechanical/electrical support building. This complex will consist of a hardened security post, a vehicle inspection area, personnel and vehicle entrapment areas, and a second security force area, a portion of which is hardened.

Security surveillance of the DAF perimeter will be sustained from two approximately 51-foot-high hardened guard towers constructed of precast concrete, double T sections. The towers will have controlled access to both levels of the corridor. The various levels will be platforms for fire control, and the top floor will consist of an observation cab. Each tower will have a break area and rest room facilities.

An approximately 1,000-square foot primary alarm station of reinforced concrete and earth berm construction with bullet-resistant access doors is included. The floor space will be divided into a control room, battery room, and rest room. A fully redundant secondary alarm station will be provided at a location within the facility.

The total estimated cost of this project has been reduced by $5,500,000, from $75,000,000 to $69,500,000, as the result of reducing the size and scope of the project by approximately 25,000 square feet, from 125,000 square feet to 100,000 square feet. These reductions are made in response to language contained in H.R. 99-235, Conference Report on the Department of Defense Authorization Act of 1986. The reduced facility still meets safety, security, and operational requirements.

The requested FY 1987 funding is required to fund initially the United States Army Corps of Engineers (USACE) fixed-price construction contract, continue the USACE construction management contract, and provide for inspection.

9. Purpose, justification of need for, and scope of project

The primary purpose of this project is to consolidate all DOE nuclear test device assembly functions at a location on the NTS which provides for deployment of optimal security measures and countermeasures and includes structures which meet current DOE safety standards for nuclear materials and high-explosives operations. In addition, this project will provide a capability for the inspection and disassembly of damaged or disabled nuclear weapons.

The above functions are necessary or are directly related to the nuclear weapons program mission. The nuclear test device assembly operations, which require mating SNM and HE materials and components to the proper configuration for testing, have been conducted at two locations on the NTS and one location at the Los Alamos National Laboratory (LANL) in Los Alamos, New Mexico.

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1. Title and location of project: Combined device assembly facility, Nevada Test Site, Nevada

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9. Purpose, justification of need for, and scope of project (contd.)

The two NTS locations were the subject of a series of security evaluations. Based upon the security evaluations, measures requiring the discontinuance of assembly activities at one of the two NTS locations and the installation of interim security improvements at the other location have been completed.

A similar security evaluation was conducted at the LANL facilities in New Mexico. The subsequent inspection and evaluation (I&E) report resulted in an immediate discontinuance of all LANL nuclear test device assembly operations involving SNM and a transfer of those operations to the NTS. Prior to the I&E report, LANL recognized the safety and environmental protection inadequacies of its local assembly operations and submitted a 1985 budget request for Project 85-D-104, Test Devices Assembly Building (TDAB), which employed the Gravel Gertie concept to contain the spread of radioactive particulates in the event of an accidental HE detonation. However, because of security deficiencies at LANL, the TDAB project has been cancelled and the TDAB functional and related facilities requirements have been included in the DAF scope.

The interim security upgrades measures and facilities constructed at one of the NTS device assembly locations minimally provide the total capacity required by the Department's weapons laboratories for the conduct of nuclear device testing. It is therefore critical that the DAF be completed on schedule. In addition, the NTS assembly facilities do not meet Department safety criteria for SNM and HE rating activities.

Funds for a dedicated damaged nuclear weapons capability are included in Project 82-D-106, Weapons Assembly Facilities, Pantex Plant, Amarillo, Texas. A congressionally approved rescoping of Project 82-D-106 provided for relocating the damaged weapons disassembly function to the NTS. Based on this approved rescoping, an agreement between the Albuquerque Operations Office and the Nevada Operations Office (NV) was written which states that "A NV Facility at the Nevada Test Site will be made available to perform...operations on selected significantly damaged nuclear weapons...that are deemed inappropriate for processing at Pantex."

The new facility has been designed with security and safety as primary features. The basic features of location, terrain, and hardened construction are essential to retaining a secure posture as the threats evolve even more severe than those currently postulated. In addition, the facility will incorporate Gravel Gertie type assembly facilities to prevent dispersion of nuclear contamination into the environment, should an accidental high level explosion occur. It will also include specialized environmental controls, filtering systems, and air locks to maximize personnel safety and to prevent contamination of the environment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Combined device assembly facility, Nevada Test Site, Nevada

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10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at about 17 percent of construction costs, Item b		$ 8,900
(1) Title I and II	$ 6,230	
(2) Title III	2,670	
b. Construction costs		52,100
(1) Improvements to land	2,250	
(2) Buildings	35,050	
(3) Utilities	2,750	
(4) Security systems	5,700	
(5) Special equipment	3,950	
(6) Construction management	2,400	
c. Standard equipment		1,200
Subtotal		62,200
d. Contingency at approximately 12 percent of above costs		7,300
Total estimated cost		$69,500

11. Method of performance

Engineering, design, and inspection will be performed under an existing NV onsite-services cost-plus-award-fee (CPAF) architect-engineer (A-E) contract utilizing competitively selected A-E subcontractors in specialized areas. Long-lead procurements will be performed by NV and its existing CPAF operating contractor. Selected construction elements, such as primary utilities and roads extensions, will be performed by the existing NV CPAF operating contractor. The major facilities construction will be performed by a competitively selected, fixed-price, prime NV contractor. Construction management services will be provided through existing agreement with the Corps of Engineers.

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a/ Based upon approximately 25 percent completion of formal design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Combined device assembly facility, Nevada Test Site, Nevada	2. Project No.: 85-D-105

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 9,000	$10,200	$29,100	$20,600	$ 600	$69,500
Total facility cost	9,000	10,200	29,100	20,600	600	69,500
2. Other project funding						
(a) Conceptual design costs	600	0	0	0	0	600
Total other project funding	600	0	0	0	0	600
Total project funding (items 1 and 2)	$ 9,600	$10,200	$29,100	$20,600	$ 600	$70,100

b. Other related funding requirements (estimated life of project: 30 years)

1. Facility operating costs	$ 6,000
2. Programmatic operating expenses directly related to the facility	3,000
3. Capital equipment not related to construction but related to the programmatic effort in the facility	200
Total other related annual funding requirements	$ 9,200

13. Narrative explanation of total project funding and related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

Conceptual design cost of $600,000 is necessary to develop a budget quality cost estimate and construction schedule.

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be 30 years.

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1. Title and location of project: Combined Device Assembly Facility, Nevada Test Site, Nevada	2. Project No.: [illegible]

13. Narrative explanation of total project funding and other related funding requirements (Contd.)

1. Facility operating costs

   This item includes all costs associated with building occupancy such as utilities, maintenance, custodial, alterations, security, taxes, etc.

2. Programmatic operating costs directly related to the facility

   Costs to support users in the accomplishment of the weapons test program are included in this item.

3. Capital equipment not related to construction but related to the programmatic effort in the facility

   This item includes cost for miscellaneous initial startup laboratory and machine shop equipment.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Research, Development, and Testing
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: [illegible]

3. Date A-E work initiated: 1st Qtr. FY [illegible]

3a. Date physical construction starts: 2nd Qtr. FY [illegible]

4. Date construction ends: 4th Qtr. FY [illegible]

5. Previous cost estimate: [illegible]
Date: [illegible]

6. Current cost estimate: [illegible] a/
Date: [illegible]

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
[illegible]	[illegible] b/	[illegible] b/	[illegible] b/	$ [illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0	0	0	[illegible]

8. Brief physical description of project

This project provides for the construction of new facilities, modifications, relocations, and additions to existing facilities, and new and replacement equipment for the revitalization of the nuclear weapons research, development, and testing (RD&T) facilities at the Los Alamos National Laboratory (LANL), the Lawrence Livermore National Laboratory (LLNL), the Nevada Test Site (NTS), and the North Las Vegas (NLV) area facilities. This project is a capital investment program to provide new or additional capabilities or capacities in the nuclear weapons testing complex. These new and modified facilities and equipment will replace or add to existing facilities that are outmoded, deteriorated, overcrowded, or are inadequate to meet the capabilities required for the current and future weapons testing program and to achieve a long-term balanced test program and

a/ The total estimated cost (TEC) is based on [illegible] conceptual design. This is the initial project in a multi-phased effort to revitalize the RD&T complex. The current planning estimate for the revitalization effort is [illegible]. This estimate includes the [illegible] included in this Project [illegible].

b/ Includes [illegible] reprogrammed from FY [illegible] weapons activities operating expenses.

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1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: 84-D-107

8. Brief physical description of project (contd.)

analysis of the materials and data obtained from such a test program. In addition to providing facilities and equipment in direct support of the testing program, this project also provides for necessary upgrades for environmental, safety, and health requirements.

The following briefly describes the purpose and justification for the subprojects to be funded in this project.

Nevada Test Site (NTS) and North Las Vegas (NLV) ATLAS Facility, Nevada

a. Field Engineering Complex, NLV, Nevada
(TEC $27,000,000; FY 1984 funding $1,300,000; FY 1985 funding $2,000,000; FY 1986 funding $8,400,000; FY 1987 funding $15,300,000)

This project, as currently proposed, will provide for the acquisition of site property, the construction of a new 96,000 square foot building, and the acquisition of an existing building, approximately 152,000 square feet, and its contiguous property. The proposed site property to be acquired for the new 96,000 square foot building will consist of an undeveloped 38.3 acre site adjoining the existing NLV complex. This tract of land will: (1) accommodate a major 96,000 square foot construction project for expansion of the field engineering complex in NLV; (2) provide contiguous undeveloped land which will provide the opportunity for effective utilization and orderly facilities development relating to other weapons program projects; and (3) provide improved physical security arrangements. In addition to the construction of the new 96,000 square foot building and a vehicle parking area, it has been recommended by the Corps of Engineers in a report dated November 1983 that the Department of Energy (DOE) purchase in its entirety a second building, the existing leased building of 152,380 square feet adjacently located to the NLV complex with paved parking on a 19.8 acre tract. The combined space utilization from these two buildings will meet the requirements of the weapons test program in the most economical fashion.

The total estimated cost of this subproject has increased by $300,000, from $26,700,000 to $27,000,000, due to the addition of the Army Corps of Engineers as construction manager to the project team and escalation adjustments due to reduced FY 1986 funding.

The need for these two facilities primarily results from the expanded programmatic support needs of LANL, LLNL, and Sandia National Laboratories (SNL). The facilities will permit consolidation of the following contractor (EG&G) functions: LLNL Engineering and Prestaging; LANL Engineering and Prestaging; SNL and Department of Defense (DOD) Engineering; General Technical Services; Research and Development; Administration; and Engineering Measurement Group Management Headquarters. EG&G support to LANL is experiencing a substantial employee turnover (25 percent annually), largely due to commuting time to NTS. The LANL test diagnostics effort has a critical need to attract and retain highly qualified EG&G support work force. A Las Vegas facility to allow some preevent staging for LANL events, in addition to other diagnostics station work,

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1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: 84-D-107

8. Brief physical description of project (contd.)

would aid in this regard. In addition, it would be more desirable and efficient to prestage in Las Vegas rather than NTS, due to the evolution of the LANL diagnostic system to digital recording techniques. A lack of an adequate preevent staging area and engineering complex in Las Vegas, coupled with a deterioration in qualified EG&G personnel, could result in costly event delays and/or loss of valuable diagnostic data in the future.

The LLNL space requirement is driven by current overcrowded conditions and the need to support new multiparameter diagnostic systems and increased mechanical fabrication activities. Additional space for shipping/receiving/storage is needed for all programs. Adequate working space for personnel without security clearance is also needed to conform to DOE security, safety, and property control procedures.

The proposed facilities are also required to replace the present EG&G Sunset Road facility. The need for this replacement is driven by expanded program requirements, the inadequacy of existing space as related to operational requirements, and the pending condemnation of the existing facilities due to a planned new runway at McCarran International Airport. A new runway will be added on land presently occupied by this facility.

The FY 1987 funding will allow completion of construction of the 96,000 square foot facility and the purchase of an existing building as recommended by the Corps of Engineers and completes funding for this subproject.

b. Test Facilities Revitalization, NTS
(TEC $22,300,000; FY 1984 funding $11,200,000; FY 1985 funding $6,600,000; FY 1986 funding $4,500,000; FY 1987 funding $0)

This subproject initiates the revitalization at the NTS in three major functional areas: (1) reconfigure Forward Area camps to replace existing substandard, overcrowded camps and to free-up prime test real estate; (2) test execution support by upgrading facilities to accommodate larger diameter devices and canisters; and (3) initiate an effort to expand and replace personnel support facilities such as housing, dining halls, and recreation facilities.

(1) Reconfigure Forward Camp Areas

The objective of this development plan calls for: (1) relocating facilities in order to access test property; (2) providing larger and more cost-efficient office, shop, and equipment complexes in alternate locations; (3) upgrading and relocating related utilities and access roads; and (4) eliminating substandard facilities.

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1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: 84-D-107

8. Brief physical description of project (contd.)

(a) Event Power System Upgrade, NTS
(TEC $10,600,000; FY 1984 funding $3,500,000; FY 1985 funding$2,600,000; FY 1986 funding $4,500,000; FY 1987 funding $0)

This subproject, which was initiated in FY 1984, will change he event power distribution system for Areas 1, 3, 4, 6, and 7 from 4.16 kV to 12.47 kV and the site operating voltage from 208V to 480V. The 12.47 kV distribution system will use four portable substations to transform the 345 kV subtransmission voltage to a 12.47 kV distribution voltage. The 34.5 kV overhead line at the northend of the test area will be extended to connect to the line paralleling the Mercury highway. Portions of the 345 kV line south of the Yucca substation and paralleling the Orange Blossom road will be upgraded. Two sustations will connect into the 34.5 kV line running parallel to Orange Blossom road on the east side of Yucca valey and the other two substations will connect into the 34.5 kV line running parallel to Mercury highway on the wst side of Yucca valley. From each substation, an underground 12.47 kV circuit will feed a splice can which wil be centrally located with respect to the testing areas. Buried 12.47 kV feeders will connect the splice can to a new 12.47/4.16 kV to 0.48 kV event site substation. These substations will provide dual primary voltage in order that the existing 4.16 kV system can be used until the new 12.47 kV system is operational. New 480V or 208/120V substations will be used throughout the event site.

The 34.5 kV line (Orange Blossom) supplying the east side of Yucca Flat is not adequate for power projections over the next few years. Because of increased power demand, he existing 34.5 kV overhead line will be extended and reconfigured into a loop system with portions of the exising 34.5 kV line being upgraded to provide overall dependability, voltage drop requirements, and the capability to sectionalize the line for maintenance and preclude interruptions and delays in test activities.

The power system upgrade is vital to LANL for conducting its est program since the current power configuration is an underground distribution system which has experienced swere deterioration as a result of age and ground motion. System failures and insufficient voltage to event sies are being experienced with increased frequency. These power outages and voltage fluctuations damage electronic recording equipment calibration and affect test signals used in diagnosing nuclear weapons test results. Thee conditions extend the event times; checkouts take longer; and, more importantly, they increase the risk of receving erroneous or possibly no data from a test.

Funding is complete for this subproject.

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1. Title and location of project: Nuclear testing facilities revitalization, various locations | 2. Project No.: 84-D-107

8. Brief physical description of project (contd.)

(b) Field Operations Support Facility
(TEC $1,508,000; FY 1984 funding $200,000; FY 1985 funding $1,308,000; FY 1986 funding $0; FY 1987 funding $0)

This subproject, initiated in FY 1984, will provide a new 16,000-square-foot preengineered metal building to house laboratory, contractor, and DOE personnel in the LLNL test support area.

There are currently 75 supervisory, professional, and clerical personnel housed in deteriorated and crowded trailers disbursed throughout the LANL test support complex. The current trailers have exceeded their use life by 200 percent, are costly to maintain and operate, are uncomfortable, and are not readily or cost effectively modified.

In addition to consolidating personnel and the efficiencies to be gained, the facility will house the 40 percent growth in personnel which is planned in the next several years as a result of programmatic increases.

Funding is complete for this subproject.

(2) Test Execution Support

The objective of this development plan calls for: (1) upgrading facilities' capability and capacity to handle additional and larger devices and canisters; and (2) upgrading facilities used for equipment research and fabrication, calibration, installation, and monitoring to service the proposed balanced test program.

(a) Staging Assembly Tower
(TEC $7,872,000; FY 1984 funding $4,220,000; FY 1985 funding $2,692,000; FY 1986 funding $0; FY 1987 funding $0)

This subproject, which was initiated in FY 1984, will provide a twin tower for use by LLNL at the NLV ATLAS Facility. It will provide a 25-foot-wide by 62-foot-long by 135-foot-high tower with two overhead hoists, four fracture-safe steel columns, and a concrete block enclosure. The tower will be equipped with an elevator, alignment scopes, and welding equipment.

The tower will provide for the assembly and alignment of diagnostic test equipment which collects data on nuclear weapons tests and provides a weatherproof work area for technicians, hardware, and specialized electronics equipment. A fixed amount of time is required for this process for each event, and this twin tower will allow work to be carried on for several events simultaneously. The LLNL test program has moved to heavier and larger diameter devices and canisters and this trend will continue. The current staging assembly tower is not adequate to handle these packages, and an increased test level under a balanced test program would require that assembly

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1. Title and location of project: Nuclear testing facilities revitalization, various locations

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8. Brief physical description of project (contd.)

be performed on several devices simultaneously. The new twin tower is required to add operating capacity to handle devices in parallel and to add capability to handle larger and heavier packages.

Funding is complete for this subproject.

(3) Personnel Support Facilities

The objective of this development plan calls for upgrading the form of housing, dining halls, and recreation facilities; the plan's initial phasing calls for the construction of dormitories at Mercury and Area 12.

(a) Dormitories - Mercury and Area 12, NTS
(TEC $2,320,000; FY 1984 funding $2,320,000; FY 1985 funding $0; FY 1986 funding $0; FY 1987 funding $0)

This subproject, which was fully funded in FY 1984, provides for the construction of one Type-A dormitory containing 55 12-foot by 20-foot rooms with individual restroom and shower facilities in a two-story building. The building will have a lobby, a laundry room, a mechanical equipment room, and a janitor's room.

These 55 units will replace a portion of the current four-bed/shared bath trailers, which constitute 80 percent of the housing available at Mercury. The trailer units to be replaced have exceeded their use life by 200 percent, are in violation of DOE fire regulations, and do not provide appropriate or adequate accommodations for personnel who are temporarily assigned to NTS or who must stay on location because of work schedules and operating procedures. The NTS users and contractors believe that adequate, comfortable housing affects the caliber of personnel they are able to attract and retain to work on the nuclear weapons test program.

Improved accommodations are required at the NTS to provide adequate living quarters for scientific and professional personnel who are required to reside at the NTS on a recurring semipermanent basis and also to provide adequate quarters for the permanent Mercury population. Existing housing at Mercury consists of old trailers; wooden communal-type dormitories; concrete block bachelor officer's quarters; and two-story, motel-type dormitories. The acceptable bachelor officer's quarters and motel-type facilities will accommodate only 230 persons. During the first five months of FY 1983, the average monthly peak overnight population was 710 persons. Thus, the monthly peak population exceeds by approximately 200 percent the space available in acceptable facilities. The peak population during an augmented test program is expected to be approximately 1,100 and will severely aggravate the situation.

During peak activity periods, housing scientific and technical personnel in Mercury has two advantages over accommodations in the nearest motels, which are 65 miles away in Las Vegas. First, motel accommodations in

CONSTRUCTION PROJECT DATA SHEET

C. Name and location of project: [illegible] | D. [illegible]

B. Brief physical description of project (Contd.):

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

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1. Title and location of project: Nuclear testing facilities revitalization, various locations

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8. Brief physical description of project (contd.)

likely require new and unique diagnostics systems. To meet all these requirements, there is an urgent need to improve existing x-ray facilities and to extend radiation source facilities to higher fluxes and shorter pulse widths, and to provide a continuous x-ray energy coverage that is not available from line sources based on available K and L atomic transitions. The synchrotron radiation source will fill that need.

Funding is complete for this subproject.

b. Intermediate Term Facilities, LLNL
(TEC $5,640,000; FY 1984 funding $5,640,000; FY 1985 funding $0; FY 1986 funding $0; FY 1987 funding $0)

This subproject, which was initiated in FY 1984 based upon a congressionally approved reprogramming action, provides for the procurement and installation of two two-story modular facilities (approximately 40,400 square feet and 45,300 square feet each) which will house approximately 276 people in total. These modular facilities are prefabricated light steel frame trailer units, varying in size but largely 12 foot by 60 foot and 12 foot by 56 foot units, which are stacked and bolted together. The facilities provide office and workspace including computer area, conference area, storage and file space, and other support areas.

LLNL has been attempting to find ways to solve a severe temporary housing problem for the last decade. Approximately half of all LLNL employees are currently housed in temporary facilities, a considerable number of which are substandard and long overdue for replacement. The preference has been to construct permanent facilities to meet this deficit, but it is clear that the Federal budget constraints will not allow this solution to be implemented in the necessary time frame. LLNL is in a position where it needs to replace the most inadequate and aged temporary space with new, upgraded space in order to meet laboratory requirements in the interim until permanent facilities can be constructed. The use of larger modular structures, while remaining portable and cost competitive, provide efficient use of space, allow for more continuous location of employees, and use less land when constructed in a two-story configuration.

This subproject will allow the demolition of overaged World War II barracks, help alleviate the "overdense" condition in the southwest quadrant of the LLNL site, relieve existing crowded trailer/building conditions, and allow the consolidation of LLNL operations which are located in a number of locations which will improve operating efficiency.

Funding is complete for this subproject.

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1. Title and location of project: Nuclear testing facilities revitalization, various locations
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8. Brief physical description of project (contd.)

Los Alamos National Laboratory (LANL), Los Alamos, New Mexico

a. X-ray Calibration Capability Upgrade, LANL
(TEC $4,900,000; FY 1984 funding $1,300,000; FY 1985 funding $3,600,000; FY 1986 funding $0; FY 1987 funding $0)

This subproject, which was initiated in FY 1984, provides for: (1) the design, procurement, and installation of beam line components at the National Synchrotron Light Source (NSLS) at Brookhaven National Laboratory (BNL), and (2) the expansion and upgrade of x-ray characterization equipment and facilities at LANL.

The first element of this subproject involves the installation of specialized equipment in two existing and available beam line ports. This consists of installing two beam line interfaces to a synchrotron source; installing beam transport; handling capabilities, sample chambers, and data acquisition and reduction equipment. The second element is the upgrade of x-ray characterization facilities at LANL which will consist of both capital construction and equipment procurement/installation. First, a building addition of approximately 1,000 square feet will be provided to house x-ray source, power supplies, and water chillers. Existing building utilities and air-conditioning will be extended to this addition. Second, modifications will be made to rooms within an existing facility. This will include removing, adding, and relocating partitions and utilities within the building.

LANL weapons program needs state-of-the-art characterized x-ray detectors. The present x-ray characterization facilities are at least 20 years old. Equipment in many cases is out of date and is housed in overcrowded quarters. Modern x-ray detector system developments require new types of characterization facilities in order to support the advanced physics experiments associated with the balanced test program. X-ray diagnostics are essential to determining nuclear device performance characteristics, as well as the characteristics of inertial fusion targets. Continued technology advances have required the development of new measurement techniques and new types of fast response detectors to characterize the absolute spectral, temporal, and spatial distribution of the x-rays generated by these devices. Existing x-ray calibration facilities are approaching their technological limits, and a new generation of x-ray sources will be needed to continue the advance in x-ray diagnostic techniques.

A dedicated synchrotron-radiation beam line would allow performance of measurements more quickly, with high accuracy and better spectral resolution, than was previously possible. The tunability and intensity of the source would allow measurements on integral detector assemblies and at energies that are otherwise unobtainable. These data could increase by an order of magnitude the ability to measure time-resolved spectral emissions in the weapons test program. Synchrotron-radiation measurements can also be used as experimental verification of theoretical models used as input to weapons design.

An example is important experimental measurements to verify calculations of programmatic interest. Similarly, x-ray measurements of materials properties related to weapons design could be facilitated.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations
2. Project No.: 84-D-107

8. Brief physical description of project (contd.)

Funding is complete for this subproject.

b. Test Fabrication Facilities, LANL
(TEC $8,000,000; FY 1984 funding $2,500,000; FY 1985 funding $5,500,000; FY 1966 funding $0; FY 1987 funding $0)

This subproject, which was initiated in FY 1984, provides for procurement and installation of special facilities equipment at the LANL test fabrication shop, construction of a dry run and alignment facility, construction of a wire rope harness fabrication and tensile testing facility with provisions for storage of both raw materials and completed assemblies, construction of a painting facility, and relocation of the tensile test equipment.

The special facilities equipment portion of this project includes a horizontal boring mill, a metal cutting production band saw, rail-mounted carts for NTS equipment rack assembly and movement between manufacturing processes, portable welding stations, a 3,200-metric-ton socket press, a socket insertion device, a 750,000-pound load cell, and a 50-ton expandable-type trailer.

The dry run and alignment facility project consists of two 11-foot diameter by 100-foot-deep testing holes; a 25-foot by 50-foot by 100-foot-high, free-standing, enclosed steel frame test tower erected over the test holes; site grading, road improvements, and paving; and utilities including water, natural gas, sewer, steam, condensate, and power. The harness fabrication and tensile testing facility consists of a building approximately 10,000 square feet in area which will be utilized to fabricate and test wire rope harnesses and fabricate weapons test rack assemblies. Relocation of existing tensile test equipment and installation of new deadman anchors will be required. The painting facility portion of this subproject consists of a 2,400-square-foot building with a 20-foot-high bay for final completion and painting of the weapons test rack assemblies.

The purpose of this subproject is to provide for the construction and equipping of a new facility to support the NTS weapons test program and to provide for the procurement and installation of special equipment at the existing fabrication shop to produce weapons test rack assemblies. The existing facilities for down-hole testing and alignment, as well as harness fabrication, are inadequate to meet the physical size requirements of the weapons test rack assemblies planned by LANL. New facilities and special equipment must be provided to meet weapons test program schedules. The existing facilities are not capable of completely handling the alignment of larger diameter weapons test rack assemblies. Alignment is a complicated procedure and surface-mating specifications are very stringent, as are the specifications on vacuum and pressure systems. The new facility will provide a capability to test and equip weapons test rack assemblies up to 10 feet in diameter and wire rope harness diameters of 3 inches.

Funding is complete for this subproject.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations
2. Project No.: 84-D-107

8. Brief physical description of project (contd.)

The TEC for this project (84-D-107) increased $300,000, from $78,940,000 to $79,240,000, due to the addition of the Corps of Engineers as construction manager to the project team and escalation adjustments for the Field Engineering Complex, North Las Vegas, Nevada, subproject. The FY 1987 funding for this project fully funds the ten subprojects included in this project.

9. Purpose, justification of need for, and scope of project

This project provides for initiating the most urgent subprojects to revitalize the capital asset base of the nuclear weapons testing complex to assure the capacity and capability of the complex to achieve and maintain a balanced annual test program on a long-term sustainable basis.

The need for a test complex revitalization program was identified in a study completed in January 1982. The study was conducted by a task force comprised of representatives from the Office of Military Application, Nevada Operations Office, and the three weapons laboratories. All aspects of the test complex capital asset base were critically reviewed during the study, and priority resource requirements were developed by year and site within the context of achieving and sustaining a balanced, long-term test program in excess of the FY 1981 level of testing.

Several factors have contributed to the current situation. One such factor is the history of the overall test program itself. The history has been one of great fluctuations and very dynamic programs. These programs have fluctuated over the years due to political uncertainties and shifts in national policy relating to underground nuclear testing and nuclear deterrence. Many of the NTS facilities are temporary, were built 10-20 years ago, and are now completely overage and deteriorated. Within the laboratories, capital funding for facilities dedicated to the test program has been sporadic at best. Many facilities now in use were built originally for other purposes.

Another factor is the combination of increased complexity and workload confronting the program. To a large extent, the requirements for information in the test program mirror the pace and scope of the underlying research and development effort. As designs become more complex and the frontiers of technology are pushed out further in the laboratories, more information of increasing detail is required from each experiment associated with a device test. Today's device tests are much more complicated than tests conducted 10 years ago. Couple this with an overall increase in the DOE and work for others testing workload, and it becomes obvious that additional diagnostic capacity and capability will be necessary at the NTS and the laboratories if the test program is to continue to support the research and development process in a timely and effective manner.

Technology changes are another factor contributing to the need for facilities and equipment. This relates directly to the designer's need for more precise measurements over broader energy spectra. The technology to meet these requirements exists today and can be cost-effectively incorporated in the program to assure maximum scientific output.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Nuclear testing facilities revitalization, various locations	2. Project No.: 84-D-107

9. Purpose, justification of need for, and scope of project (contd.)

The last major factor driving the need for the test complex revitalization effort is the nature and geography of NTS. Many of the NTS facilities were placed in their present locations many years ago to serve a purpose that was appropriate at that time. As test real estate has been used up, some of the facilities, in addition to being old, are not presently in the most advantageous location. Some facilities actually occupy prime test real estate which, as time goes by, is becoming more precious. The lack of real estate at Yucca Flat is beginning to force more tests to Pahute Mesa, especially for those tests near the Threshold Test Ban limitation of 150 kt. Future projections show the test program being conducted on Pahute Mesa. This condition will require new and upgraded facilities in that area in order to keep operating costs down. Facilities are needed in Las Vegas in order to reduce the number of people who have to travel the 70-120 miles to the test site. It has been proven that much of the experimental assembly work can be accomplished in Las Vegas and then moved to NTS for final adjustments, alignments, etc. These facilities are needed in order to attract and maintain the most capable people for the program. Better housing, eating, and recreation facilities are needed at NTS because: (1) many of the existing facilities are substandard, and (2) today's top engineers, scientists, technicians, and craftsmen cannot be attracted to NTS jobs if they must use existing facilities. Some additional facilities are required because of the added workload imposed by the increased test program, coupled with other work being performed at NTS.

This project provides for only a few of the more critical line item construction subproject requirements necessary to support the objective of achieving and sustaining a balanced, long-term test program.

The nuclear weapons development program is made up of a highly complex set of activities extremely dependent on current and advanced technology facilities and equipment to meet its varied needs. In turn, the successful performance of the research and development (R&D) program contributes directly to the quality and reliability of the nuclear weapons stockpile.

The consolidation of the nuclear weapons RD&T revitalization needs into a new FY 1985 initiative focused the issue of the total needs of the RD&T program and is illustrative of the interdependence of the R&D and test programs to: (1) develop and apply nuclear weapons technology to maintain and improve current weapon systems, and (2) develop new weapons for the nuclear weapons stockpile in accordance with national security requirements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: 84-D-107

10. Details of cost estimates a/

	Total cost
a. Engineering, design, and inspection	$79,240
b. Construction costs	
(1) Improvements to land	
(2) Buildings and building modifications	
(3) Other structures	
(4) Special facilities	
(5) Utilities	
c. Standard equipment	
d. Removal cost less salvage	
e. Contingency	
Total estimated cost	$79,240

The estimates by location are as follows:

Nevada Test Site and North Las Vegas ATLAS Facility, Nevada	$54,300
Los Alamos National Laboratory, New Mexico	12,900
Lawrence Livermore National Laboratory, California	12,040
Total	$79,240

11. Method of performance

Design and procurement of the conventional facilities will be performed under negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding. Design and procurement of the special facilities will be performed by the operating contractor.

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a/ Based upon completed conceptual designs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear testing facilities revitalization, various locations

2. Project No.: 84-D-107

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$48,340	$26,900	$ 4,000	$79,240
Total facility costs	48,340	26,900	4,000	79,240
2. Other project funding				
(a) Conceptual design costs	350	0	0	350
Total other project funding	350	0	0	350
Total project funding (items 1 and 2)	$48,690	$26,900	$ 4,000	$79,590

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design

Conceptual design cost of $350,000 is necessary to develop a budget quality cost estimate and construction schedule.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, Various locations

2. Project No.: 87-D-121

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 2nd Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: None
Date:

6. Current cost estimate: $32,000
Date: 1/86

7. Financial schedule

Fiscal Year	Obligations	Costs FY 1985	FY 1986	FY 1987	After FY 1987
Prior to FY 1985	$ 0	$13,474	$12,325	$ 1,216	$ 0
1985	27,100	2,946	13,700	10,454	0
1986	28,700	0	8,600	11,500	8,600
1987	32,000	0	0	9,600	22,400

8. Brief physical description of project

This project for general plant improvements includes such construction and/or modifications as roads (onsite and offsite), utilities, minor structures, and technical facilities required in the operation of weapons program installations. A project of this type cannot be fully detailed in advance. The subprojects are examples of items under consideration. In general, the estimated funding for each location and listed subprojects is preliminary in nature and primarily indicative of the size of the subproject and the relative magnitude of the requirements. It should be noted also that the continuing study of requirements will result in changes in scope of some of the subprojects. Other subprojects will be added with the necessary postponement of some of these now included, dependent upon conditions or situations not now apparent.

This project covers requirements of the weapons production complex, the Albuquerque Operations Office and its operating contractors, the Y-12 Plant (under the Oak Ridge Operations Office), and the Y-12 operating contractor.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, Various locations	2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project

A general plant project is necessary to meet new and changing program developments, to correct deficiencies, and for minor utility and road construction. Research developments and changes in technical program requirements frequently result in the need for altered or new construction items not previously anticipated. In the past, these changes have included additions to buildings to house new equipment for weapons production support functions; construction of new small buildings; extensions or modifications to utilities; and general area development.

The weapons production and surveillance general plant project estimate for FY 1987 of $32,000,000 provides the minimum level of effort essential to meet the existing programmatic requirements, requirements for maintenance and replacement due to the aging of the plants, and other capital facilities.

The following subprojects are examples of items of work which may be performed at the major locations covered under this project. These are grouped by location under the following reason-of-need categories: (1) Health, Fire, and Safety; (2) Pollution Abatement; (3) Maintenance; (4) Safeguards and Security; (5) Programmatic; and (6) Other.

The preliminary estimate of FY 1987 requirements by major area is as follows:

Albuquerque Operations Office	$ 24,600
Oak Ridge Operations Office	7,400
Total	$ 32,000

Albuquerque Operations Office - Weapons Production Complex .... $ 24,600

(1) Health, Fire, and Safety

a. Fire station, Pinellas Plant .... $ 975

This 6,000 square foot fire station will replace the existing 1,970 one truck garage. It will include vehicle bays, equipment storage areas, an extinguisher recharging facility, and firefighter training rooms.

b. Criticality Warning Beacon System, Rocky Flats Plant .... $ 250

This project will supply an internal visual alarm system to each of the major production buildings that include a glovebox air handling system which produces very high ambient noise levels. The use of an aural high-level annunciator for an alarm signal is ineffective as a single mode aural alarm because personnel in these areas wear hearing protective devices.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, Various locations

2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project (contd.)

c. Body Counter Modification, Rocky Flats Plant .... $ 600

The Body Counter area will be remodeled and enlarged by approximately 800 square feet. Improvements include a new body counter room, another dressing room, separate restroom facilities for men and women, an area for engineering development, and a covered entry way. This will enable the plant to handle the increase in body counts and comply with the Department of Energy (DOE) Order that requires Rocky Flats to do invivo bioassays and analyses to determine radiation exposure of all personnel.

Subtotal - Health, Fire, and Safety .... $ 1,825

(2) Pollution Abatement

a. Waste Management Operation, Bendix Plant .... $ 850

An existing structurally sound pre-engineered metal wall building will be refurbished to provide for consolidation of waste management operation. The refurbishment will include the exterior skin, new insulation, new insulated roof, new doors, new restrooms, construction of offices, and general storage space. Consolidation will improve efficiency and compliance with federal and state regulations governing the management of hazardous waste onsite control of materials and record keeping documents.

b. Environmental Standards Facility, Mound Plant .... $ 900

This 7,500 square foot facility will replace existing facilities that have residual contamination levels with the potential of affecting the reliability of certain analytical results. This facility will provide laboratory and office space for the Environmental Section and space to consolidate the various environmental operations and personnel. It provides laboratory space with low residual background levels for more sensitive analyses, and provides a working environment that is representative of a certification operation which needs to detect and control the increasingly lower levels of pollutants.

c. Hazardous Waste Storage Facility, Rocky Flats Plant .... $ 750

This project will provide storage of nonradioactive hazardous wastes. This will enable the plant to comply with the Environmental Protection Agency regulations for the safe storage of these materials.

Subtotal - Pollution Abatement .... $ 2,500

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, Various locations	2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project (contd.)

(3) Maintenance

a. Install Condensate Tanks Boilerhouse, Bendix Plant .... $ 640

This project will install insulated tanks in the West Boilerhouse to collect and store condensate return from the steam distribution system. Installation of holding tanks will permit the returned condensate to be reused as a substantial energy source.

b. Chilled Water Secondary System Modification, Bendix Plant .... $ 850

In order to provide the controlled amounts of chilled waterflow required to maintain temperature and humidity control in production areas, the plant will have to convert 10 pumps to variable frequency driver, install bypasses for 24 pumps, replace three-way valves with two-way valves in 26 air handling units, install 46 shutoff valves, and make control modifications to the primary chilled water pumps in the East and West Boilerhouses.

c. Chilled Water System Upgrade, Pinellas Plant .... $ 275

Chilled water mains are to be replaced and upgraded. The existing chilled water mains are old and deteriorating due primarily to normal breakdown of exterior insulating materials.

d. Telecommunicatons Facility, Pinellas Plant .... $ 570

The Telecommunications Operational Model (OPMODEL) is slated to become a major backbone carrier for Department of Energy (DOE) nationwide telecommunications and the Pinellas Plant is one of the sites for which an OPMODEL mode is planned. In order to have a reliable and effective service, they will need to provide for installation of the earth station, time division multiple access electronics, a network management and technical control system, and a video teleconferencing facility.

e. Electrical/Mechanical Utility, Albuquerque, Headquarters .... $ 500

Utility systems presently serving the Headquarters complex are very old and in need of replacement. They include sanitary sewers, water, gas stream, electric, telephone, and fire alarm circuits.

Subtotal - Maintenance .... $ 2,835

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, Various locations

2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project (contd.)

(4) Safeguards and Security

a. Security Surveillance Upgrade, Pinellas Plant .... $ 300

This project is a continuation of enhancements to the security surveillance assessment and counterforce systems at the plant. It includes additional guard posts, intrusion sensory detection systems, additional exterior lighting, expansion of closed circuit television and related switching equipment, additional vehicle barriers at property entrances, and an obstacle course to support physical training requirements of the inspector force.

b. Security Training Facility and Running Track, Pantex Plant .... $ 600

To meet the increased training requirements for guards at the plant, this facility will require: (1) a classroom for 540 people, (2) a separate armory for a Multiple Integrated Laser Engagement System weapon, (3) a storage area for training equipment, (4) offices for training officers, (5) inside exercise area with associated equipment, and (6) relocation of the obstacle course in close proximity to the exercise track and training facility.

c. Surveillance Closed Circuit Television, Rocky Flats Plant .... $ 660

This project will install closed circuit television cameras on top of each guard tower and on top of three different buildings. Other equipment including a microwave tower, microwave links, zoom lenses, monitor recorders, and controls will also be installed. The project is required to enhance security at the plant.

d. Plant Protection Locker Room Expansion, Rocky Flats Plant .... $ 200

More guards are needed to meet the increased security measures. These additional guards need lockers to store their uniforms and related equipment. This project will expand the plant protection men's locker room by 900 square feet.

e. Remote SECOM Center, Transportation Safeguards Division (TSD), Albuquerque .... $ 500

An alternate SECOM Control Center will be built at a remote location. This center is necessary to provide 100 percent backup and assure continuous communications backup with the Transportation Safeguards Division transporation fleet.

f. TSD Academy Driving Course, Albuquerque .... $ 900

This Vehicle Training Area will be used to train TSD couriers in the routing and emergency operation of tractor/trailers and other convoy vehicles. This site is necessary because no such area exists at this time.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, Various locations	2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project (contd.)

g. Range Upgrade, Pantex Plant .... $ 500

Improvements will consist of adding wind breakers, redoing the beams, replacing target carriers, and constructing a small building for personnel staging, instruction and weapon cleaning.

h. Southeastern Courier Section - Firearm Range, Oak Ridge .... $ 200

This project will construct a new firearm qualification range for the couriers. They currently share a range with Martin Marietta. As Martin Marietta continues to increase the size of its guard force, it becomes difficult to schedule use of their range.

i. Southeastern Courier Section - Tactical Buildings, Oak Ridge .... $ 750

This project will provide site improvement for the area where TSD will be conducting maintenance.

j. Transportation Safeguards Training Academy, Albuquerque .... $ 850

This project will provide for construction of a Central Supply and Armory Building, a Maintenance Building, and a Truck Driver Training Building. It will also include the modification of an existing supply building into a range classroom, construction of two helicopter pads, and provision of a tractor-trailer work area.

k. Tactical Building, Transportation Safeguards Division Academy .... $ 300

This project will construct two staff office buildings to provide space for a staff of 17.

Subtotal - Safeguards and Security .... $ 5,760

(5) Programmatic

a. Trajectory Sensing Signal Generator Inspection Facility, Bendix Plant .... $ 875

This facility provides a dry environment for the inspection and certification of trajectory sensing signal generators. Moisture has been identified as a cause of cold temperature test failures. Presently they are being handled with other electronic assemblies in nonhumidity controlled areas.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, Various locations
2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project (contd.)

b. Consolidate and Upgrade Precision Pattern Inspection, Bendix Plant .... $ 470

This project will construct a separate precision pattern inspection area with suspended ceiling to improve cleanliness, factory temperature, utility changes, and lighting. Consolidation of the two areas will permit consolidation of supervisory personnel and improve efficiency.

c. Expand Polymer Plant In-Process Storage, Bendix Plant .... $ 190

A pre-engineered metal building will be located adjacent to the existing polymer building. This additional storage capacity is necessary to accommodate the increasing quantity of intermediate products.

d. Two MEV Van De Graff Facility, Pinellas Plant .... $ 680

This facility will expand the capabilities of the existing accelerator to permit the use of several new types of nondestruction analyses. These new techniques will virtually eliminate the present dependence on outside vendors for high voltage ion beam analysis and will greatly enhance the ability to provide essential quality control analyses in support of the production and development of advanced, high technology products.

e. Plant Office Building, Pantex Plant .... $ 850

This project will provide office space to house 75-80 people. The additional office space is due to the planned increase in personnel to support the intense upgrading of the plant operations and computer applications.

f. Metrology Tooling Facility, Pantex Plant .... $ 800

This expansion will provide additional space to perform technical design interpretation and measurement functions. Extremely crowded conditions make design, evaluation, and measurement functions extremely difficult which can result in erroneous tooling acceptance and safety incidents.

g. Vehicle Maintenance Facility, Pantex Plant .... $ 250

This project will relocate the vehicle maintenance tool crib and provide for general store warehousing. This expansion is needed to house parts for maintenance of the TSD fleet.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, Various locations
2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project (contd.)

h. In-Process Container Staging Facility, Pantex Plant .... $ 250

This project will provide a staging facility to store protective containers, high-explosive transportation carts, metal trays, and form lines for the containers. These items are used to protect the cables and high-explosive surface during transportation of the components to the assembly cells.

i. Thermal Test Facility, Mound Plant .... $ 650

This project will provide for additional thermal chambers. Thermal environment test programs are increasing in number, complexity, and duration of testing.

j. Space Chiller - Powerhouse, Mound Plant .... $ 650

This project will install a 1,600 ton chiller and associated equipment in the present Powerhouse. It will provide the reliability required in meeting the environmental needs of existing and new production facilities.

k. Primary Explosive Surveillance Facility, Mound Plant .... $ 200

This project will provide space for explosives surveillance. The lack of safety controls and presence of other explosives in disassembly and analytical facilities prevents Mound from providing all requested data to establish baseline information on primary explosive components.

l. Unclassified Machine Shop, Rocky Flats Plant .... $ 900

This project will provide an unclassified machine shop. The existing unclassified machine shop operation is provided by Lake Arbor Machine Shop whose lease expired in July 1984. It was renegotiated to July 1987 at which time the new facility will take over the function.

m. Expansion of Maintenance Fabrication Shop, Rocky Flats .... $ 175

This project will expand the Maintenance Fabrication Shop at the Precision Forge Facility. The expansion is needed to accommodate additional personnel to handle a increase in the workload, new equipment to increase the capability of the shop, and a bridge crane to facilitate work on large equipment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, Various locations — 2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project (contd.)

n. Graphite and Tool Steel Stone Facility, Rocky Flats .... $ 100

This project will provide space to house inventories of graphite and tool steel materials. This will provide a secure area, with limited access, which will assure better control of the inventory.

Subtotal - Programmatic .... $ 7,040

(6) Other

a. Video Teleconferencing Room, Bendix Plant .... $ 900

This project will provide a facility to accommodate video teleconferencing capability between four DOE installations. This will fulfill the DOE Headquarters request that Bendix Plant be one of the sites.

b. Roof Ramps and Walkways, Bendix Plant .... $ 730

This project will install access ramps and walkways to various pieces of the utility system located on the roof. This will reduce not only the time needed to fix and maintain the utility system, but also wear and tear on the roof.

c. Office Building, Mound Plant .... $ 500

This project will provide a permanent office area. With the additional workforce, the current offices are very cramped causing violations of good safety and housekeeping practices.

d. Influent Tank Repair - Mound Plant .... $ 150

This program will repair one the influent tanks in the worst condition. This tank is an integral part of the concrete building and over the years has corroded with subsequent leakage of contaminated waste water.

e. Administrative Support Building, Rocky Flats Plant .... $ 820

This building will be constructed to provide offices for audiovisual services, a photographic laboratory, and a high-bay audiovisual studio. The Audiovisual Services function is located in three buildings. The consolidation will relocate a nonplutonium related function outside of the Perimeter Security zone.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, Various locations

2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project (contd.)

f. Administration Building Parking Lot Expansion, Rocky Flats Plant .... $ 180

This will expand the existing parking lot for the Administration Building to accommodate the added personnel.

g. Reverse Osmosis Product Water Storage Pond, Rocky Flats Plant .... $ 550

A new 12 million gallon asphalt-lined pond is needed to provide reverse osmosis product water for reuse in cooling towers and boiler plant makeup. The original ponds that were to be used are contaminated.

h. Office Building Remodeling, Albuquerque .... $ 810

The remodeling of this building will require complete rehabilitation of the existing structure's interior/exterior in order to restore it to meet certain General Services Administration and OSHA standards for office buildings.

Subtotal - Health, Fire, and Safety .... $ 4,640

Oak Ridge Operations Office - Weapons Production Complex .... $ 7,400

(1) Health, Fire, and Safety

a. Preaction Sprinkler .... $ 150

This project will replace the existing degraded sprinkler system with a preaction sprinkler system. The work will include replacement of valves, pneumatic tubing, and associated release devices.

b. Gamewell Cable Replacement .... $ 400

This project will replace the existing system's auxiliary loops inside the major production buildings. The existing system's cable insulation is decayed and brittle and malfunctions of the alarm system are being experienced.

Subtotal - Health, Fire, and Safety .... $ 550

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, Various locations	2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project (contd.)

(2) Pollution Abatement

a. Bear Creek Burial Ground Perimeter Fencing	$ 400

This project consists of placing an eight foot tall chain link fence around the perimeter of the Bear Creek Burial Grounds. This fence is needed to meet the Tennessee State Department of Health and Education requirements and to enhance overall security.

b. Additional Resource Conservation and Recovery Act	$ 500

This facility will consist of seven individual cells with dikes, 1-1/2 hour fire rated walls and ceiling, and safety equipment for handling drums of flammable, corrosive, and toxic material. The existing storage area is at a bare minimum and may delay pickup of hazardous waste materials from generators within the plant.

Subtotal - Pollution Abatement	$ 900

(3) Maintenance

a. Upgrade Power Systems	$ 850

This project will provide an upgrade to the current electrical power system supporting the Computing and Telecommunicating Division building. The equipment projected to be located in this building through FY 1987 will exceed the current power capacity.

b. Replace Air Handlers, Conference Room, and Central Records	$ 250

The air-handling units in these two areas will be replaced due to age and deterioration. The existing units cause high maintenance costs, personnel discomfort, and an inadequate atmosphere for records storage.

c. Replace Underground Tower Water Lines	$ 200

The project will replace all underground lines on this cooling tower. Corrosion has caused leaks in the system and loss of chemicals to the creek. When this happens it is necessary to cut off tower water to process equipment and refrigeration equipment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects,
Various locations
2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project (contd.)

d. Central Chilled Water System Connector .... $ 500

This project would connect the development area chilled water system to the chilled water system in the adjacent engineering technology and radiation safety facilities, thereby eliminating the need to replace the obsolete systems and providing a very beneficial cost savings to the plant.

e. Replace Creek Tile .... $ 500

Inspection of the creek tiles has revealed deterioration of a major section of two 54-inch creek tiles. Failure in the tiles could disrupt the movement of coal to the steam plant, block access to several storage buildings, and would effect the storm sewer system for a major portion of the plant.

Subtotal - Maintenance .... $ 2,300

(4) Safeguards and Security

a. Remote Monitoring of Material Access Areas (MAA) Alarms .... $ 995

This project will provide remote monitoring capability to utility operators to assure utility equipment is operating properly, thus assuring that certification requirements for production components and materials are met. The operators are prohibited access to MAA by safeguards regulations.

b. Building Addition .... $ 300

This project will construct office space to accommodate the increase in personnel and consolidate the divisional staff located in several buildings.

c. Special Safeguards Requirements .... $ 500

Improvements and modifications are needed to upgrade the security of the Y-12 Plant. They are identified as modifications to perimeter fencing, security gates, vehicle and pedestrian barriers, security lighting, and assessment devices.

Subtotal - Safeguards and Security .... $ 1,795

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, Various locations

2. Project No.: 87-D-121

9. Purpose, justification of need for, and scope of project (contd.)

(5) Programmatic

a. Office and Training Area .... $ 950

The building will house Electrical and Electronics Services Department offices, training facilities, and a conference room. This will relieve a serious overcrowding condition which currently exists.

b. Women's Changehouse .... $ 400

This project will include structural changes to provide a "clean/dirty" area, piping for adequate shower capacity, and installation of lockers and shoe and clothes bins storage space. The female population in this area has increased significantly and now must change in facilities remote from the work area, thereby reducing productivity and creating unreasonable working conditions.

c. Characterization Laboratory Upgrade .... $ 200

This project would renovate an existing wet chemistry laboratory which is no longer required, thus providing the facility with a small office area and a laboratory for corrosion studies in support of the main surface characterization laboratory. Greater accuracy and reliability of corrosion studies can be achieved through providing an optimum environment where the chance of sample contamination is minimized.

d. Office Modifications .... $ 105

This project will enclose the first floor office area and add a mezzanine for additional office space and a small conference room. This is necessary to end the frustration of noisy and cramped offices and the inefficiency of using conference rooms in other buildings.

e. Construct a Computer Room .... $ 200

A computer room is required to house a host computer which will serve three shops with computer-aided equipment control, computer-based process data collection, and program for data management and statistical analysis. It will provide an adequate power supply, temperature and humidity control, and acoustical wall and ceiling surfaces.

Subtotal - Programmatic .... $ 1,855

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 87-D-121

10. Details of cost estimate

a.	Engineering, design, and inspection ......)	$ 32,000
b.	Land and land rights ......)	
c.	Construction costs ......)	
d.	Contingencies ......)	
	Total estimate cost ......)	$ 32,000

11. Method of performance

To the extent feasible, design and inspection will be performed under negotiated lump-sum architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids. In some instances, it will be more economical or timely for design, inspection, procurement, or construction to be done by operating contractors and others already under contract to the Government.

12. Funding schedule of project funding and other related funding requirements

Not applicable.

13. Narrative explanation of total project funding and other related funding requirements

Not applicable.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Short-Range Attack Missile II (SRAM II) Warhead Production Facilities, various locations

2. Project No. 87-D-122

3. Date A-E work initiated: 1st Qtr., FY 1987

3a. Date physical construction starts: 1st Qtr., FY 1987

4. Date construction ends: 4th Qtr. FY 1991

5. Previous cost estimate: None
Date:

6. Current cost estimate: $55,000
Date: 1/86

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 5,000	$ 5,000	$ 5,000	$ 2,100
1988	21,300	21,300	21,300	12,000
1989	20,200	20,200	20,200	24,000
1990	8,500	8,500	8,500	12,000
1991	0	0	0	4,900

8. Brief physical description of project

This project will provide new and modified building space, new process systems, special facilities and additional equipment needed for production, inspection, and certification of raw materials, components, subassemblies, and final assembly of the warhead currently proposed for the U.S. Air Force Short-Range Attack Missile II (SRAM II).

Production of the new warhead for the SRAM II requires new, revised, or expanded capabilities at the various weapons production plants to meet current weapon design requirements.

Bendix Plant

Capability and capacity equipment to be provided under this project include: a new ultra-precision measuring machine for parts inspection; a compression press to mold high temperature plastic; standards and calibration equipment to support new requirements for electrical, environmental, and mechanical calibrations; and manufacturing, instrumentation, and diagnostic equipment to improve production quality, checkout telemetry units, and perform material analyses and characterizations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Short-Range Attack Missile II (SRAM II) Warhead Production Facilities, various locations

2. Project No. 87-D-122

8. Brief physical description of project (contd.)

Pinellas Plant

Equipment will be provided for capability and capacity related processing activities associated with the manufacture of neutron generators, lightning arrestor connectors, and quartz digital accelerometers. Equipment will be provided for use in the assembly and testing of lightning arrestor connectors and for material handling in the neutron generator production areas. Fabrication, assembly, and tuning equipment for the quartz digital accelerometer will be provided to manufacture the force sensing elements and perform final frequency tuning.

Pantex Plant

Equipment will be provided for the standards laboratory, material testing laboratory, test fire, and process inspection activities in addition to equipment for production operations in the fabrication and assembly activities. An accelerated aging unit system for compatibility testing of the SRAM II will be provided consisting of a temperature chamber with associated sampling and recording equipment. Instrumentation and equipment for production support and process control are proposed for use in the assembly and testing of the SRAM II. A 20,000-square-foot building addition will be built on the existing weapons assembly training facility for training and certification of assembly workers. The present facility has reached maximum capacity and will not accommodate the requirements of the SRAM II production program.

Mound Plant

Production and testing of components require new and modified equipment for the SRAM II warhead booster assembly, detonators and detonator cable assemblies, and component evaluation equipment for stockpile maintenance. Equipment for support of manufacturing and evaluation will also be provided in order to achieve required sprint capacities. The above equipment will be installed in existing facilities.

Rocky Flats

Additional equipment will be provided at the Rocky Flats Plant to meet capacity requirements in machining, processing, inspection, and laboratory services. The SRAM II production equipment needs include such items as a lathe, grinder, mill, pressure vacuum systems, scanning electron microscope, mass spectrometer, chemical analyzers, and related instrumentation. All equipment will be installed in existing buildings.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Short-Range Attack Missile II (SRAM II) Warhead Production Facilities, various locations

2. Project No. 87-D-122

8. Brief physical description of project (contd.)

Y-12 Plant

This project will provide equipment, process systems, modifications to existing equipment, and equipment or facility refurbishment. Capacity requirements include the upgrade of an existing pressure vessel for the production of salt components, weld equipment, assembly facilities, dye penetrant facility, refurbishment of life certification and prebake ovens, leak test station, plating equipment, upgrade of controls on an existing hydroform for the production of multiple components, support equipment for material handling, and certification equipment consisting of a diffractometer and networking equipment. Also included are approximately 25,000 square feet of new building space which will provide capacity to overcome the crowded substandard office conditions that exist, as well as provide space and support facilities for personnel working in this program. New capability items include assembly room improvements including procedure stations for subassembly operations, process controls for the hydraulic press area, and specialized material certification equipment.

The FY 1987 funding requested will provide for the Title I and Title II design on the training facility addition, dye penetrant facility, and production support building; the development of specifications, the procurement of long-lead items of equipment and special facilities, and for the initiation of construction.

9. Purpose, justification of need for, and scope of project

This project provides the plant facilities and equipment required to produce the nuclear warhead for the SRAM II. Maximum use will be made of existing capabilities of existing weapon production facilities.

The Bendix Plant will need equipment to meet both capability and capacity requirements imposed by SRAM II design and production rates. The capability items are necessary to support new requirements such as unique electrical, environmental, and mechanical measurements; calibration specifications. The capacity items are required to support production processes; for instance, the five-axis machining center is required to produce squib valves.

The Pinellas Plant will require additional equipment to sustain its neutron generator production capability and to implement new capabilities to produce a quartz accelerometer that is more accurate and reliable than previous technology.

The Pantex Plant's existing assembly training facility has reached its maximum throughput rate for certification of assembly personnel. A temporary building is being planned to help in the short term; however, a permanent facility is required. Equipment needs are of a general nature necessary to support production of any new weapons system.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Short-Range Attack Missile II (SRAM II) Warhead Production Facilities, various locations

2. Project No. 87-D-122

9. Purpose, justification of need for, and scope of project (contd.)

The Mound Plant will require additional equipment capability and capacity to support the production rate of detonator and stockpile maintenance activities associated with SRAM II production schedule. Additional equipment and modifications to existing solid tritium storage facilities will be required to support a boost system.

The Rocky Flats Plant will need additional equipment capacity in its cold machining areas, its standards and Plutonium analytical laboratories, and its Plutonium Recovery Facility.

The Y-12 Plant will need most of the requested equipment to support salt and plating processes, assembly and subassembly operations, and process control and product certification requirements. As part of the general support requirements, new secure office space is required to house personnel who will work on this program. Additional welding equipment and assembly space will be required to support the complex design requirements.

This system is currently in an early design state and many uncertainties remain to be resolved before final design definition. Therefore, the total estimated cost includes an allowance for design and process uncertainties.

Annual operating costs for the expanded facilities are estimated at $2,000,000. Programmatic costs are estimated at $5,000,000 per year.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Short-Range Attack Missile II (SRAM II) Warhead Production Facilities, various locations

2. Project No. 87-D-122

10. Details of cost estimate a/

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 14 percent of construction cost, item b		$ 3,400
b. Construction costs		23,525
(1) Buildings		
(a) Weapons assembly training facility addition, Pantex Plant; approximately 22,000 square feet at about $182 per square foot	$ 4,000	
(b) Weapons production support building, Y-12 Plant; approximately 25,000 square feet at about $80 per square foot	2,000	
(2) Special facilities		
(a) Mound Plant	6,675	
(b) Y-12 Plant	10,850	
c. Standard equipment costs		14,420
Subtotal		$ 41,345
d. Contingency at approximately 17 percent of above cost		6,955
e. Design uncertainties		6,700
Total project cost		$ 55,000

Estimates by location are as follows:

Bendix Plant, Kansas City, Missouri	$ 3,300
Pinellas Plant, St. Petersburg, Florida	6,500
Pantex Plant, Amarillo, Texas	8,500
Mound Plant, Miamisburg, Ohio	8,000
Rocky Flats Plant, Golden, Colorado	4,000
Y-12 Plant, Oak Ridge, Tennessee	18,000
Design uncertainties	6,700
Total	$ 55,000

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

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a/ Estimate based on completed or partially completed conceptual designs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Short-Range Attack Missile II (SRAM II) Warhead Production Facilities, various locations

2. Project No. 87-D-122

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	Total
a. Total project funding							
(1) Total facility costs							
(a) Construction line item	$ 0	$ 2,100	$12,000	$26,000	$12,000	$ 4,800	$ 55,000
Total facility costs	$ 0	$ 2,100	$12,000	$26,000	$12,000	$ 4,800	$ 55,000
(2) Other project funding							
(a) Conceptual design	$ 200	$ 0	$ 0	$ 0	$ 0	$ 0	$ 200
Total other project funding	$ 200	$ 0	$ 0	$ 0	$ 0	$ 0	$ 200
Total project funding (items 1 and 2)	$ 200	$ 2,100	$12,000	$26,000	$12,000	$ 4,800	$ 55,200

b. Other related funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ 2,000
2. Programmatic operating expenses directly related to the facility	5,000
Total other related costs	$ 7,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
1. Other project funding
(a) Conceptual design
Conceptual design costs of approximately $200,000 were incurred in the process of developing and improving the project cost estimate and schedule.

b. Total related funding requirements
It is estimated the programmatic life of these facilities will be about 20 years.

1. Facility operating costs
Approximately $2,000,000 per year will be required to cover the cost of utilities, maintenance, janitorial services, and related overhead costs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Short-Range Attack Missile II (SRAM II) Warhead Production Facilities, various locations

2. Project No. 87-D-122

13. Narrative explanation of total project funding and other related funding requirements (contd.)

    2. Programmatic operating expenses directly related to the facility
    The average annual incremental cost of direct labor, tooling procurement, tooling fabrication, and overhead is estimated at $1,000,000 per year.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Protective clothing decontamination facility, Rocky Flats Plant, Golden, Colorado

2. Project No.: 87-D-123

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 3rd Qtr. FY 1988

4. Date construction ends: 3rd Qtr. FY 1989

5. Previous cost estimate: None
Date:

6. Current cost estimate: $5,200
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 500	$ 500	$ 500	$ 500
1988	4,700	4,700	4,700	2,700
1989	0	0	0	2,000

8. Brief physical description of project

This project will provide a new, fully equipped facility at the Rocky Flats Plant for washing and drying potentially plutonium-contaminated protective clothing and for cleaning and testing respirators and respirator filters. The facility will support all plutonium processing activities at the plant and will be located within the plutonium area perimeter security zone adjacent to the plutonium analytical laboratory.

The building to be provided by this project will be a 12,800 square-foot, single-story, metal frame, and reinforced concrete slab-on-grade structure with a structurally independent filter plenum. The building will meet Rocky Flats Plant design load criteria for a nonhazardous facility. Approximately 4,000 square feet of the building will be allocated to washing and drying potentially contaminated clothing at a rate of 1,600 pounds per hour. Approximately 2,000 square feet will be allocated to cleaning and testing 800 respirators per day. Storage for clean clothing and respirators will occupy approximately 2,000 square feet. Approximately 1,200 square feet will be allocated to two locker rooms, a lunch and break room, and a small office. The remainder of the space will be used for receiving, sorting, folding, and supply storage.

Special facilities to be provided include the filter plenum system and material handling system. The filter plenum will be an airtight carbon and stainless steel unit supported by a reinforced concrete slab-on-grade. Two stages of high efficiency particulate air (HEPA) filters will be provided to meet health, safety, and environmental requirements for containment of plutonium. An automated material handling system will be installed for delivering clothing and respirators to selected points in the work area.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Protective clothing decontamination facility, Rocky Flats Plant, Golden, Colorado

2. Project No.: 87-D-123

8. Brief physical description of project (contd.)

Standard equipment to meet the design capacity includes two 400 pound washer/extractors and a 200 pound dryer to be relocated from the existing facility and the following new equipment: two 400 pound washer/extractors, two 400 pound dryers, a cleaning and testing system for respirators and filters, an emergency 45 horsepower boiler steam generator (for dryer heat), and associated minor equipment.

Utilities to be provided include connections to the existing plant-wide steam and condensate system for building and dryer heat. Energy conservation features to be provided include air-to-air heat recovery from the building exhaust stream to supplement heating and cooling of the working areas. Heat recovery from washer waste water and a solar heat collector will supplement the hot water heating requirements for washers. The remaining hot water heating requirements will be supplied by steam from the plant-wide steam system. An electrical substation and emergency generator will be installed.

The new facility will be designed to meet Department of Energy (DOE) standards for air filtration, effluent handling, waste filtration, and related environmental design considerations.

The FY 1987 funding will be used for Title I and II design of the new facility, and for procurement of some long-lead equipment.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to replace an existing inadequate plutonium area protective clothing decontamination facility. The existing facility at Rocky Flats is quite marginal in satisfying today's workload and can only provide one day's inventory. Thus, a serious mechanical failure of more than one day's duration could seriously affect plutonium operations and a new facility is required for production continuity and assurance. Offsite commercial facilities capable of handling potentially plutonium-contaminated materials are not available in the Rocky Flats area. If plant production requirements are to be met in future years, the new facility must be completed.

Plutonium refining and fabrication operations require that workers be provided with respiratory equipment and protective clothing at all times. Supplies of clean protective clothing and respirators are critical to maintaining production schedules and safe work standards. The existing clothing decontamination facility is substandard and requires three-shift operation and frequent maintenance work to maintain operations. The amount of contaminated clothing has increased from 14,500 pounds per week in 1979 to a present workload in excess of 41,000 pounds per week for an increase of 184 percent. The load is expected to increase to over 47,000 pounds per week in the near future, further straining existing capacity. In addition to protective garments, respiratory equipment must also be decontaminated. The number of respirators cleaned has increased from 920 per week in 1979 to a present workload in excess of 1,700 respirators per week, for an increase of over 80 percent. The load is expected to increase to 2,300 respirators per week in the near future. The sorting and storage area in the existing building

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Protective clothing decontamination facility, Rocky Flats Plant, Golden, Colorado

2. Project No.: 87-D-123

9. Purpose, justification of need for, and scope of project (contd.)

is inadequate. Carts filled with clothing are frequently stored outside, unprotected from the weather, or lined up in the corridors causing unsafe conditions.

Good practice for HEPA filters require that a minimum of two stages of HEPA filters be provided in any facility with a potential of containing plutonium. The existing building has only one bank of filters. Space limitations preclude adding a second stage.

Added equipment and increased personnel levels have allowed the existing facility to maintain a workload that has almost tripled in recent years. There is no longer space for internal expansion in the existing building. The present facility occupies 3,500 square feet in manufacturing building 778. External expansion of the existing facility is impractical since it is bordered on the east by the maintenance machine shop, on the west by an underground process waste pit, and on the north and south sides by numerous underground utility lines.

The existing facility will be converted to maintenance and/or production storage space when vacated. Annual operating costs of the new facility are estimated to be $1,230,000, essentially the same as the cost of operating the existing facility.

10. Details of cost estimate a/	Item cost	Total cost
a. Engineering, design, and inspection at approximately 14 percent of construction costs, item b		$ 500
b. Construction costs		3,500
(1) Improvements to land including roads, fencing, and walks	$ 50	
(2) Building, decontamination facility of 12,800 square feet at about $171 per square foot	2,200	
(3) Special facilities including filter plenum, internal utilities and material handling system	770	
(4) Utilities	480	
c. Standard Equipment including washer and dryer equipment		500
Subtotal		4,500
d. Contingency at approximately 16 percent of above costs		700
Total estimated cost		$ 5,200

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a/ Estimate based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Protective clothing decontamination facility, Rocky Flats Plant, Golden, Colorado

2. Project No.: 87-D-123

11. Method of performance

Design will be performed under a negotiated architect-engineer contract. Inspection and procurement will be performed by the operating contractor. Construction will be accomplished by a cost-plus-fixed-fee contractor.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 0	$ 500	$ 2,700	$ 2,000	$ 5,200
Total facility costs	0	500	2,700	2,000	5,200
2. Other project funding					
(a) Conceptual design costs	20	0	0	0	20
(b) Other project related costs	0		15	15	30
Total other project funding	20	0	15	15	50
Total project funding (Items 1 and 2)	$ 20	$ 500	$ 2,715	$ 2,015	$ 5,250

b. Other related annual costs (estimated life of project: 20 years)	
1. Facility operating costs	$ 1,160
2. Capital equipment not related to construction but related to the programmatic efforts in the facility	70
Total related annual costs	$ 1,230

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Total facility costs
      (a) The construction line item will construct the new facility.

   2. Other project funding
      (a) Other project costs include the costs of preparing the conceptual design report and design criteria before project funds are available, for radiation monitoring and decontamination during construction, and for safety analysis reports when installation is complete.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Protective clothing decontamination facility, Rocky Flats Plant, Golden, Colorado

2. Project No.: 87-D-123

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Total related funding requirements

1. Facility operating costs

Facility operating costs include the annual costs for utilities, labor, and materials.

2. Capital equipment not related to construction but related to programmatic efforts in the facility

Programmatic capital equipment will be required in this facility at an annual average cost of $70,000 per year.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Environmental, safety, and health upgrade, Mound Plant, Miamisburg, Ohio	2. Project No. 87-D-127
2. Date A-E work initiated: 1st Qtr. FY 1987 3a. Date physical construction starts: 3rd Qtr. FY 1987	5. Previous cost estimate: None Date:
4. Date construction ends: 3rd Qtr. FY 1989	6. Current cost estimate: $ 4,300 Date: 1/86

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 2,400	$ 2,400	$ 2,400	$ 1,000
1988	1,900	1,900	1,900	2,600
1989	0	0	0	700

8. Brief physical description of project

This project will correct several serious long-standing site environmental problems at the Mound Plant. The project is divided into two elements: (1) eliminating process water from the storm drainage system, and (2) upgrading site sanitary and storm sewer systems.

Eliminating Process Water from Storm Drainage System

This subproject consists of removing from the open storm drainage system all single pass cooling water which is now discharging from points throughout the entire plant. Approximately 300,000 gallons of this process cooling water currently enters the open drainage system daily. As a result of this practice, the level of suspended solids attributable to surface runoff discharged into the Miami River through Mound's main drainage ditch exceeds permit limitations. Discharge of this process cooling water will be prevented from entering the open surface drainage by placing the five major users of single pass cooling water on closed loop cooling water systems. This will remove approximately 300,000 gallons per day of current discharge. The construction required to accomplish this includes installing heat exchange brine loops in four process buildings, installing a booster pump in the brine loop of one existing building, and installing a cooling tower for a closed cooling system on one building. This work will include minor demolition, installation of [illegible] brine supply and return lines, insulation, heat exchangers, [illegible] copper process water lines, and associated electrical power service, equipment and controls. The remaining small volume releases throughout the plant will be combined in a process water piping

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental, safety, and health upgrade, Mound Plant, Miamisburg, Ohio	2. Project No. 87-D-127

6. Brief physical description of project (contd.)

system and piped to the discharge point or handled on small closed loop package coolers. Adequate instrumentation and monitoring points will be provided in the project to insure no contaminants enter the Great Miami River.

Upgrading Site Sanitary and Storm Sewer Systems

This subproject is the result of a two-year comprehensive study of the Mound storm and sanitary sewer systems to evaluate corrective measures needed to maintain control of sewer discharges. Included in this subproject are repairs to approximately 60 sections (2,700 lineal feet) of sanitary sewer line and approximately 50 sections (3,000 lineal feet) of storm sewer line which are broken or restricted to the point that contaminants seep into the surrounding ground and underlying aquifer. Additional corrections to surface storm drainage deficiencies will contribute to a reduction of the amount of suspended solids contained in storm runoff which is under National Pollution Discharge Elimination Systems (NPDES) permit limitation, and requires control and settling to prevent trace radioactive contamination in local soil from moving offsite.

This subproject will provide three pieces of analytical equipment including both liquid and gas chromatographs and a mass spectrometer. This equipment is needed to perform analysis of effluents which is required by existing NPDES regulations governing priority pollutants.

7. Purpose, justification of need for, and scope of project

The purpose of this project is to correct numerous deficiencies in the site storm and sanitary systems and avoid violation of current regulations governing discharge of pollutants. Mound's ability to meet NPDES limits is directly related to correction of the sanitary and storm sewer systems and the current practice of discharging single pass process cooling water into the surface runoff system. It is possible that environmental activist groups will challenge Mound's NPDES permit exceptions in the future and such action could result in significant monetary judgments besides reflecting adversely on Mound, DOE, and local public relations and community acceptance. The DOE Dayton Area Office has already received correspondence from the State of Ohio Environmental Protection Agency (EPA) requiring corrective action to be taken. Mound's major collection conduit for surface runoff is a natural stream channel which empties into the Miami River and the Ohio River, a major navigable waterway. The number of NPDES permit violations by the Mound Plant's existing storm drainage system has resulted in regulatory enforcement action by the State of Ohio EPA. This project will remove process water discharges to the storm sewer systems in order to meet the NPDES permit limitations.

The justification of the two subprojects are as follows.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental, safety, and health upgrade, Mound Plant, Miamisburg, Ohio

2. Project No. 87-D-127

9. Purpose, justification of need for, and scope of project (contd.)

Eliminating Process Water from Storm Drainage System

The current NPDES suspended solids limits for the main drainage ditch are restrictive in order to control the quality of process cooling water discharged into the Miami River via the ditch. Because of tight restrictions imposed to control releases of potential suspended solids in process cooling water, permit compliance during storm runoff is difficult, and in most cases, unachievable. Almost all of the suspended solid exceptions during 1984 were not caused by operational discharges but were related to construction/maintenance activities and/or storm runoff. In FY 1984, Mound exceeded its NPDES suspended solids permit limitations on 56 occasions. This magnitude of noncompliance has had a serious impact on permit renewal by the Ohio EPA. By separating process water from storm runoff, the main drainage channel would carry minimal flow except during storm events and the expected future NPDES limitations could be easily met, bringing Mound into compliance with the Clean Water Act. The EPA will also require monitoring of suspended solids during storm events to demonstrate compliance with suspended solids compliance.

Upgrading Site Sanitary and Storm Sewer Systems

The thirty plus years of plant operation without a major project to upgrade and maintain the sanitary and storm sewer system, coupled with facility additions over this same time which have added significantly to the load on these systems, has been brought into sharp focus by recent concerns over environmental pollution. A two-year study recently completed has identified the need for major repairs to the sanitary sewer systems to limit contaminant leakage and infiltration.

10. Details of cost estimate a/

		Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 23 percent of construction cost, item b			$ 670
b. Construction costs			2,920
(1) Utilities		$ 2,710	
(a) Upgrade sanitary and storm sewer systems	$1,310		
(b) Separate process water	1,400		
c. Standard equipment		210	
(1) Environmental analysis equipment	210		
Subtotal			$ 3,590
d. Contingency at approximately 20 percent of above cost			710
Total project cost			$ 4,300

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a/ Estimate based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental, safety, and health upgrade, Mound Plant, Miamisburg, Ohio

2. Project No. 87-D-127

11. Method of performance

Design, inspection, and procurement will be performed by the operating contractor. Installation of standard equipment where required will be accomplished by a combination of the operating contractor and negotiated fixed-price engineering contractors. To the maximum extent possible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project funding					
(1) Total facility costs					
(a) Construction line item	$ 0	$ 1,000	$ 2,600	$ 700	$ 4,300
Total facility costs	$ 0	$ 1,000	$ 2,600	$ 700	$ 4,300
(2) Other project funding					
(a) Conceptual design report	$ 100	$ 0	$ 0	$ 0	$ 100
Total other project funding	$ 100	$ 0	$ 0	$ 0	$ 100
Total project funding (Items 1 and 2)	$ 100	$ 1,000	$ 2,600	$ 700	$ 4,400

b. Other related funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ 50
Total other related costs	$ 50

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   - (1) Other related project funding
     - (a) Conceptual design for this project has been completed at a cost of $100,000.

b. Other related funding requirements
   - (1) Facility operating costs
     - (a) Annual facility operating costs include utilities, maintenance, janitorial services, and related overhead.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Receiving and shipping facility, Pinellas Plant, St. Petersburg, Florida
2. Project No.: 87-D-130
3. Date A-E work initiated: 1st Qtr. FY 1987
3a. Date physical construction starts: 1st Qtr. FY 1988
4. Date construction ends: 4th Qtr. FY 1989
5. Previous cost estimate: None
Date: N/A
6. Current cost estimate: $2,700
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 300	$ 300	$ 300	$ 250
1988	2,400	2,400	2,400	2,000
1989	0	0	0	450

8. Brief physical description of project

This project provides for the construction of a single story receiving and shipping facility, approximately 8,000 square feet, and the procurement and installation of standard equipment required to make this facility fully operational. The new structure will be located on existing Government-owned land within the boundaries of the Pinellas Plant site. This facility will be isolated from the existing Pinellas Plant. It will consist of three loading docks, incoming shipment staging areas, a shipping area for nonweapons-related and weapons-related unclassified materials, offices, and the necessary roads, utilities, paving, and fencing to make the facility operational. The purpose is to minimize the potential damage from an explosive or otherwise damaging device(s) intended to disrupt the nuclear weapons production mission of the plant.

The building will also include a mezzaine office area to conduct required administrative and clerical functions; a chemical storage area for temporary secure storage of materials until release; a break area and restrooms; and a utility room housing housekeeping maintenance equipment and supplies.

The building will be of textured concrete block with reinforced concrete slab orgrade. The roof system will consist of metal decking. The exterior walls will be concrete masonry units with insulation to provide an energy efficient building. Utilities will include extension of the existing plant electrical distribution system, domestic water, and sewage system. New equipment will be provided for use in receiving, security checking, verifying, classifying, paletizing, and staging all equipment, materials, and supplies delivered to the plant. Equipment to be installed will include power dock levelers, a

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Receiving and shipping facility,
Pinellas Plant, St. Petersburg, Florida
2. Project No.: 87-D-130

8. Brief physical description of project (contd.)

powered conveyor serving five work stations, batteries and battery chargers, and an electric general purpose lift vehicle. Other normal storage, handling, filing, and communications warehouse equipment will be included.

The requested FY 1987 funding will be used in Title I and II design and initiation of improvements to land.

9. Purpose, justification of need for, and scope of project

The Pinellas Plant is a key facility with unique capabilities in the production of components for nuclear weapons and is, therefore, an integral part of the national security program. These capabilities require the development, maintenance, and full integration of safeguards and security upgrades to ensure the plant's ability to perform its mission in support of the national security program.

The new facility will enhance security operations by allowing full onsite inspection of all incoming material prior to their being sent to warehousing facilities or the sensitive manufacturing area and by restricting access of commercial delivery and shipping vehicles to a remote area of the plant property. All material entering the plant site could be checked for explosive devices which, if found, could be processed by the proper people without endangering either the main manufacturing area, reducing the potential loss of production, or the large mass of plant personnel. The location of the building on the plant site, outside the security fence, would limit the number of unsecured people inside the secured area which would aid the security force in maintaining the security required for the plant. This project includes procurement and installation of new equipment in order to receive, verify, security check, classify, palletize, and stage all equipment, materials, and supplies.

In addition to security enhancements, the new remote receiving/shipping building will provide classification and palletization for improved inventory control and accommodation of various size and types of delivery vehicles with the use of dock pits and dock levelers.

The shipping function located within the new receiving building will be one of primary dispatching duties. All packing, crating, and addressing will continue to be done in the main plant building. All nonproduction shipments and only nonclassified product will be distributed to uncleared vendor vehicles at this point. All classified materials will continue to be picked up from the main building, thereby insuring the security of the product. This change in procedures will cause a 98 percent drop in the amount of vehicles coming inside the outer and inner security perimeter. During FY 1984 there were 7,840 vendor vehicles entering the plant site, of those only 150 were picking up classified shipments. By utilizing the receiving and shipping facility in this manner, the Pinellas Plant can achieve a high degree of security from possible saboteurs and terrorists who might use this avenue as a means to damage plant and property.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Receiving and shipping facility,
Pinellas Plant, St. Petersburg, Florida

2. Project No.: 87-D-130

10. Details of cost estimate a/

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 18 percent of construction cost, item b		$ 290
b. Construction costs		1,650
(1) Improvements to land, roads, and fencing	$ 330	
(2) Building	1,090	
(3) Utilities	230	
c. Standard equipment including material handling, support, storage, filing, and communications equipment		285
Subtotal		$ 2,225
d. Contingency at approximately 21 percent of above cost		475
Total estimated cost		$ 2,700

11. Method of performance

Contracting arrangements are as follows:

a. Design, procurement, and construction: Fixed price contract awarded on the basis of competitive bidding.
b. Title III inspection: By architect-engineer contractor under operating contractor surveillance.
c. Equipment will be procured and installed by the operating contractor.

12. Funding schedule of project funding and other related funding requirements

Not applicable.

13. Narrative explanation of total project funding and other related funding requirements

Not applicable.

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a/ Based upon a completed conceptual design.

Department of Energy
FY [illegible] Congressional Budget Request
Construction Project Data Sheet
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: [illegible]

2. Project No.: [illegible]

3a. Date A-E work initiated: [illegible]

3b. Date physical construction starts: [illegible]

4. Date construction ends: [illegible]

5. Previous cost estimate: [illegible]

6. Current cost estimate: [illegible]

7. Financial schedule

Fiscal Year	Authorization	Appropriation	Obligations	Costs
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

8. Brief physical description of project

[illegible]

[illegible]

[illegible]

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: [illegible] Rocky Flats Plant, [illegible] 2. Project No.: [illegible]

3. Brief physical description of project [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

4. Purpose, justification of need for, and scope of project

[illegible]

[illegible]

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Structural upgrade of existing plutonium facilities, Rocky Flats Plant, Golden, Colorado	2. Project No.: 86-D-122

9. Purpose, justification of need for, and scope of project (contd.)

1. Continue to operate the plant without substantial modification.
2. Modify the plant structures and vital equipment to counteract deficiencies under current design criteria.
3. Decommission all or part of the plant and relocate plant capabilities to other DOE sites.
4. Decommission all or part of the plant and relocate plant capabilities to new facilities at a new site.

The BRCC final report on the DOE LRUS issued in March 1984 concluded that the study is sufficiently thorough and objective to allow decisions to be made regarding relocation or modifications to the Rocky Flats Plant. Subsequently, the DOE analyzed both the LRUS and the BRCC reports to characterize logical courses of action consistent with the two reports.

Two important facts became evident. First, the current level of risk to the public from accidents of record and potential future accidents at the Rocky Flats Plant is much less than routinely accepted risks; and, second, limited facility upgrading would maintain the current low level of risk to the public as the surrounding population increases. The modification options were evaluated in detail to assess the cost-benefit aspects of upgrading the plutonium facilities. DOE decided to upgrade selected facilities which currently represent the source of the highest risk to the public. By strengthening three plutonium facilities to withstand the highest credible wind-loadings, the current risk to the public could be reduced approximately tenfold. Such upgrading would maintain the current low level of risk to the public from accidents at the plant by offsetting any increase attributable to population growth during the next 40 years. Upgrading the selected facilities identified in this project will reduce the contribution of natural phenomena at Rocky Flats to the composite risk from 93 percent to about 9 percent.

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 15 percent of construction costs, Item b		$ 600
b. Construction costs		4,100
(1) Building 707 - strengthen concrete columns	$ 100	
(2) Building 707A - strengthen concrete columns	100	
(3) Building 708 - strengthen exterior wall panels	100	
(4) Buildings 776/777 - strengthen concrete walls, roof deck, roof beams, and steel columns	2,500	
(5) Buildings 779, 779A, 779B - strengthen concrete walls and roof girders	1,300	
Subtotal		4,700
c. Contingency at approximately 20 percent of above costs		900
Total estimated cost		$ 5,600

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Structural upgrade of existing plutonium facilities, Rocky Flats Plant, Golden, Colorado

2. Project No.: 86-D-122

11. Method of performance

It is proposed that the architect-engineer perform Titles I, II, and III design engineering under a prime, negotiated fixed-price contract with DOE. The design and construction will be performed in phases to minimize the effect on plant production and other essential activities. The construction will be performed by the onsite Cost-Plus-Award-Fee contractor and/or, if security requirements can be satisfied, by competitively bid fixed-price lump sum contractors administered by DOE. Inspection and construction coordination will be performed by the operating contractor's inspection department under the existing contract.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$ 600	$ 2,300	$ 2,700	$ 5,600
Total facility costs	600	2,300	2,700	5,600
2. Other project funding				
(a) Conceptual design	5	0	0	5
Total other project funding	5	0	0	5
Total project funding (items 1 and 2)	$ 605	$ 2,300	$ 2,700	$ 5,605

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design costs
          The conceptual design costs incurred were $5,000.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Environmental hazards elimination, various locations
2. Project No.: 86-D-123
3. Date A-E work initiated: 1st Qtr. FY 1986
3a. Date physical construction starts: 1st Qtr. FY 1987
4. Date construction ends: 2nd Qtr. FY 1989
5. Previous cost estimate: $39,000 Date: 1/85
6. Current cost estimate: $39,000 Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$ 8,700	$ 7,700	$ 7,700	$ 4,100
1986 Sequestered	(0)	(460)	(460)	(0)
1987	17,300	18,300	18,300	14,400
1988	13,000	13,460	13,460	13,500
1989	0	0	0	7,000

8. Brief physical description of project

This project provides for the elimination of critical environmental hazards at facilities operated by the nuclear weapons program. Specific details on the individual subprojects follow.

Eliminate waste water contamination - Bendix Plant

This subproject will provide for excavation and removal of contaminated surface materials and new facilities for elimination of discharges contaminated with polychlorinated biphenyl (PCB) liquids from the Bendix Plant storm sewer system to local surface waters. It will also provide a replacement for an old deteriorating hazadous solution storage system. PCB cleanup will involve excavation and removal of soil, gravel, concrete, and blacktop from areas of previous hazardous waste spills and disposal sites.

Elimination of PCB contaminated discharges into local surface waters from the storm sewer system will be accomplished by rerouting the discharges into the sanitary or industrial waste water systems. This work will include new sewer lines from the existing floor drains, foundation drains, and catch basins. In addition, the ductwork associated with some air handling systems servicing two molded plastics areas will be replaced due to known PCB contaminated oil film.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental hazards elimination, various locations

2. Project No.: 86-D-123

8. Brief physical description of project (contd.)

A total of 26 new aboveground tanks, complete with auxiliary facilities and equipment (basins and pumps), will be installed for storage of hazardous solutions. The existing underground tanks will be removed from service, the remaining contents removed, and the tanks backfilled with sand to preclude any possible contamination of adjacent areas. The acid and caustic rinse water piping from the main building to the waste treatment lagoons will be replaced with new lines enclosed in a concrete utility trench.

Industrial waste water pretreatment and recycle cooling water plant - Bendix Plant

This subproject will construct an industrial waste water pretreatment facility (total gross area of approximately 160,000 square feet) which is required to meet the Federal and local standards for discharges to the Kansas City, Missouri, sanitary sewer system. This project will include installation of a cooling system and the distribution piping, filters, and connection of equipment to recycle water throughout the main manufacturing plant.

Electrical system PCB elimination - various locations

This subproject will replace old electrical capacitors and transformers which use PCB for the dielectric that now require rebuilding to remain operational. The electric systems at the Bendix, Pinellas, Rocky Flats, and Y-12 Plants; and the Los Alamos National Laboratory include PCB containing equipment that requires replacement.

At the Bendix Plant, 95 PCB capacitors located internally throughout the plant will be replaced with non-PCB capacitors. At the Pinellas Plant, 10 PCB-filled transformers will be replaced and associated switchgear will be upgraded. Thirteen PCB-filled transformers are located throughout the Rocky Flats Plant; these will be replaced, existing switchgear will be changed to assure compatibility, and overall system capacity will be increased to accommodate forseeable electrical loads. This subproject will replace 24 PCB-filled transformers and 3 capacitors located throughout the Los Alamos National Laboratory complex and about 50 PCB-filled transformers located throughout the Y-12 Plant.

A total of 89 medium sized transformers currently on line at the Y-12 Plant are filled with PCB liquid coolant. Approximately 30 of these transformers are to be replaced under Project 84-D-124, Environmental Improvements, Y-12 Plant.

The requested FY 1987 funding will be used for construction of two subprojects at the Bendix Plant (eliminate waste water contamination and industrial waste water pretreatment and recycle cooling water plant). It will also be used to continue replacement of PCB contaminated electrical transformers at all sites.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental hazards elimination, various locations	2. Project No.: [illegible]

3. Purpose, justification of need for, and scope of project

Eliminate waste water contamination - Bendix Plant

The objective of this construction project is to assure that the Bendix Plant storm sewer effluents comply with the State of Missouri water quality standards and that hazardous waste handling and storage facilities meet groundwater contamination regulations. Missouri water quality standards (10CSR20-7) specifically prohibit the discharge of any measurable quantity of persistent, bioaccumulative, man-made toxic substances such as PCBs to the waters of the state. This subproject is required to eliminate sources of PCB contamination from the Bendix Plant to assure compliance with the facility's current National Pollutant Discharge Elimination System (NPDES) permit.

PCBs are not knowingly discharged by the Bendix Plant nor have materials containing PCBs been used in production processes since 1974. The main heating and cooling systems which previously used PCB heat transfer fluids were drained, flushed eight times, and refilled with non-PCB heat transfer fluid to achieve compliance with the Toxic Substances Control Act. In addition, process and storm water sources discharging from these specific PCB-using areas were rerouted to meet this facility's original NPDES permit.

Subsequent to these preventative measures, residual levels of PCBs were detected in the storm sewer effluent at decreasing levels. The sources of these PCBs were reasoned to be subsurface contamination resulting from heat transfer system spills prior to the time PCBs were of concern. The levels of PCBs in the effluent continued to decrease to a less than detectable amount with only an occasional excursion occurring, leading to the conclusion that the contamination source was being eliminated through attrition.

Starting in June 1982, however, PCBs began to be chronically detected in two of the storm sewer outfalls and are continuing to be detected in daily samples. Missouri state pollution officials were notified about these detections in accordance with the NPDES permit provisions.

In addition to analyzing known PCB areas within the Bendix Plant to determine corrective action for removal of potential PCB sources, this project will reroute other potential contaminated discharges from the storm sewer system into either the sanitary sewer system or industrial waste water pretreatment facility.

Installation of new aboveground tanks is necessary to meet existing and proposed regulations on groundwater contamination which require that all hazardous waste be stored aboveground with proper containment. The installation of new acid and caustic lines from the main building to the waste water treatment lagoons is necessary due to line breaks and the potential for environmental contamination. Repairs have indicated extensive deterioration and the occurrence of line breaks has increased in recent years. The lines are buried underground, thus posing the threat of undetected leaks; the new lines will be installed in a new concrete utility trench which will provide a means for periodic inspection.

[illegible]

1. [illegible]

2. [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental hazards elimination, various locations	2. Project No.: 86-D-123

9. Purpose, justification of need for, and scope of project (contd.)

EPA has recently published information that states when PCB, or PCB-contaminated equipment, is exposed to fire, two of the most deadly compounds known may be released. In recent years, several buildings in the United States have been abandoned for long periods of time due to these compounds resulting from fires involving PCB transformers. Contaminated soot from the fires was spread throughout the buildings via the ventilation ducts. An 18-story building in Binghampton, New York, has been closed since February 1980. The first six floors of an office building in San Francisco contaminated by a PCB fire were closed for about 15 months. The cleanup cost was approximately $20,000,000. The rags used to remove the contamination from this building were so toxic that they required disposal as a toxic chemical waste.

The weapons production facilities and laboratories are critical to national security. A PCB fire at any of these sites which would result in even a partial loss of one facility would be very grave. The risk of toxic chemical contamination can be eliminated by installing equivalent non-PCB replacements. Since much of the PCB equipment is nearing its designed life expectancy, the cost of its replacement is reasonable.

Without the corrective measures to be provided by this project, there will be the potential for noncompliance citings at the Bendix Plant. In addition, operations will be threatened by continued usage of electrical systems requiring rebuilding.

10. Details of cost estimate a/	Item cost	Total cost
a. Engineering, design, and inspection at approximately 13 percent of construction costs, item b		$ 1,600
b. Construction costs		12,600
(1) Site improvements	$ 100	
(2) Building	9,860	
(3) Utilities	2,640	
c. Equipment including replacement transformers and capacitors		18,200 b/
Subtotal		32,400
d. Contingency at approximately 20 percent of above costs		6,600
Total estimated cost		$39,000

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a/ Estimate is based on completed conceptual design.

b/ Replacement of transformers and capacitors may be accomplished at some sites by individual construction contracts requiring removal, replacement, and proper disposal of PCB contaminated equipment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental hazards elimination, various locations

2. Project No.: 86-D-123

10. Details of cost estimate (contd.)

The estimates by location are as follows:

Bendix Plant, Kansas City, Missouri	$15,000
Pinellas Plant, St. Petersburg, Florida	4,300
Rocky Flats Plant, Golden, Colorado	1,800
Y-12 Plant, Oak Ridge, Tennessee	7,600
Los Alamos National Laboratory, Los Alamos, New Mexico	3,700
Contingency, all sites	6,600
Total	$39,000

11. Method of performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$4,100	$14,400	$13,500	$ 7,000	$39,000
Total facility costs	$4,100	$14,400	$13,500	$ 7,000	$39,000
2. Other project funding					
(a) Conceptual design costs	$ 190	$ 0	$ 0	$ 0	$ 190
Total other project funding	$ 190	$ 0	$ 0	$ 0	$ 190
Total project funding (items 1 and 2)	$4,290	$14,400	$13,500	$ 7,000	$39,190

b. Other related funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ 3
Total other related funding requirements	$ 3

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental hazards elimination, various locations

2. Project No.: 86-D-123

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funds
      (a) Conceptual design costs
      Conceptual design for this project was prepared by the operating contractor at a cost of $190,000.

b. Other related funding requirements
   It is estimated that the programmatic life of this project is 20 years.

   1. Facility operating costs

      Facility operating costs of $3,000 annually includes operating labor, equipment maintenance, and supplies.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Safeguards and site security upgrading, Phase II, Mound Plant, Miamisburg, Ohio

2. Project No.: 86-D-124

3. Date A-E work initiated: 1st Qtr. FY 1986

3a. Date physical construction starts: 4th Qtr. FY 1986

4. Date construction ends: 2nd Qtr. FY 1989

5. Previous cost estimate: $5,000
Date: 1/85

6. Current cost estimate: $5,000
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$ 3,000	$ 2,000	$ 2,000	$ 700
1986 Sequestered	(0)	(120)	(120)	(0)
1987	2,000	3,000	3,000	3,300
1988	0	120	120	800
1989	0	0	0	200

8. Brief physical description of project

This project will provide safeguard upgrading to improve Mound's current security posture. Construction of these facilities will permit Mound to perform effectively its security mission both now and in the future. The current scope of this project consists of the following subprojects:

- Security Operations Facility
- Special Materials - Plutonium Processing (SM-PP) Precinct Building
- Alarm Display and Communications System

Security Operations Facility

This project provides for the construction of a three story free standing facility, approximately 11,400 square feet. The building will be a concrete construction and will have connecting corridors to an adjacent building. This facility consolidates various security staff functions which have been temporarily housed in locations remote to one another. The facility will include an emergency operation center as well as the hardened security alarm and communications center. In addition, the building will house technical security development and tempest testing activities, a locksmith shop and vault, office space consolidating security staff functions, and conference/classroom space.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Phase II, Mound Plant, Miamisburg, Ohio
2. Project No.: 86-D-124

8. Brief physical description of project (contd.)

Special Materials - Plutonium Processing (SM-PP) Precinct Building

This subproject provides for the construction of a single story concrete structure, approximately 5,800 square feet. This building replaces temporary protective forces facilities and includes change/locker rooms; restrooms; SWAT storage and training areas; alternate alarm display and communications center; armory; garage; hardened observation post; and a ready area that is needed to accomodate approximately 60 security personnel.

The building will be hardened. A hardened observation post will improve site surveillance. This building will greatly improve the protective forces' response time.

Alarm Display and Communications System

The Alarm Display and Communications System (ADCS) subproject provides for the design, procurement, and installation of an alarm display and communications system. The ADCS will include two Safeguard Control Centers. One control center will be located in a hardened area within the Security Operations Facility. The second center (alternate center) will be located in the hardened Security Precinct Facility.

The scope of this project has altered somewhat from the prior request due to a number of influences. The current scope reflects a clearer understanding and interpretation of threat guidance and site specific protective systems design techniques. The scope also includes findings of results from a Department of Energy (DOE) Inspection and Evaluation audit.

The FY 1987 funding request will allow completion of this project.

9. Purpose, justification of need for, and scope of project

Recent evaluations of the Mound Plant have determined the need for the proposed facilities and alarm and communications systems to enable Mound to respond more effectively to the threat spectrum outlined in part in the DOE threat criteria. Over the past year, Mound has initiated action to increase its security/guard force manpower and improve the nature and extent of its guard force, particularly in training, response tactics, communications, and command and control.

Currently, security management/administrative personnel are located in several geographically separated unhardened buildings in the main manufacturing area. The first and second floors of the Security Operations Facility will provide much needed space for Mound's security management. With this arrangement, security personnel will be able to carry on their day-to-day business in a much more coordinated and effective manner. Additionally, consolidation of security management/administrative personnel within a single facility will result in improved productivity and effectiveness. Also, planned space for the Emergency Operations Center should be adequate for current and anticipated requirements for many years.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Phase II, Mound Plant, Miamisburg, Ohio

2. Project No.: 86-D-124

9. Purpose, justification of need for, and scope of project (contd.)

The current primary security alarm and communications center has identified security weaknesses. The current emergency operations center is too confined and is unacceptable for protracted situations. In addition, there are no facilities available for tempest testing or technical security development/evaluation activities.

The new SM-PP Precinct Building will provide the badly needed space in the right location to comply with Mound security needs. During the past year, the protective force has increased resulting in an over crowded condition. All protective force personnel are currently housed in a single change room in an unhardened building located on the protected area perimeter.

The existing alarm and communications system is unsuitable for Mound's long-term security needs. The system needs upgrading to ensure the ability to collect alarm data and present information which promotes rapid assessment and response.

Recent evaluations of the Mound Plant have determined the need to harden areas where special nuclear materials (SNM) is stored and handled and to improve the level of detection assessment and response against penetration of the site and removal of SNM. This upgrading project consists of eight items which have been developed to provide a coordinated, well-balanced improvement to the storage, control, and protection of SNM and to provide a more secure environment to the entire Mound Plant.

These improvements provide the corrective action to weaknesses identified by recent evaluations of the Mound Plant. Over the past year, Monsanto has initiated action to increase its guard force manpower and improve the nature and extent of its guard training, particularly in response to tactics, communications, and command and control. The request for an additional armored vehicle, the outdoor training area, hardened guard posts, the surveillance locations, and site modifications all relate to improving the overall guard force responsiveness and effectiveness.

This project is required to enable Mound to respond effectively to the threat spectrum outlined in part in the DOE threat criteria.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Phase II, Mound Plant, Miamisburg, Ohio
2. Project No.: 86-D-124

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 15 percent of construction costs, item b		$ 550
b. Construction costs		3,700
(1) Site improvements	$ 250	
(2) Buildings (Precinct 5,800 square feet at approximately $131 per square foot, Operating facility 11,400 square feet at approximately $123 per square foot)	2,150	
(3) Utilities	250	
(4) Special facilities	1,050	
c. Standard equipment		25
Subtotal		$4,275
d. Contingency at approximately 17 percent of above costs		725
Total estimated cost		$5,000

11. Method of performance

DOE will secure all architect-engineer services and the major building and construction contracts.

Mound Research Corporation (MRC) may secure design and construction support, monitoring and management assistance depending upon in-plant workloads. Assistance in this area may be requested from MRC's Corporate Engineering Department or contracted to an outside Engineering Management firm if our workloads are too heavy to cover adequately the project.

All special facilities, design procurement, and construction shall be performed by MRC.

12. Funding schedule of project funding and other related funding requirements

Not required.

13. Narrative explanation of total project funding and related funding requirements

Not required.

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a/ Based upon completed conceptual design.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Safeguards and site security upgrading, Phase II, Pantex Plant, Amarillo, Texas
2. Project No.: 86-D-125
3. Date A-E work initiated: 1st Qtr. FY 1986
3a. Date physical construction starts: 3rd Qtr. FY 1986
4. Date construction ends: 1st Qtr. FY 1988
5. Previous cost estimate: $10,000 Date: 1/85
6. Current cost estimate: $10,000 Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$1,500	$1,500	$1,500	$1,000
1986 Sequestered	(0)	(90)	(90)	(0)
1987	8,500	8,500	8,500	5,000
1988	0	90	90	4,000

8. Brief physical description of project

This project includes four subprojects as described below, all of which are to enhance the overall security posture of the Pantex Plant.

Subproject A - Command center expansion.
Subproject B - Emergency lighting upgrade and armored vehicle garage.
Subproject C - Administrative services facility.
Subproject D - Vehicle entrance guard station.

a. Subproject A - Command center expansion

This subproject provides an addition to the security command center (SCC) of approximately 7,600 gross square feet and the modification of existing floor area of approximately 1,200 gross square feet. Construction of the proposed expansion will be of similar materials and methods used in the existing facility. Cast-in-place reinforced concrete columns, beams, and roof slab will be used with precast concrete panels for exterior walls. Site work will consist of paving and revised drainage to accommodate the expanded facility.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Phase II, Pantex Plant, Amarillo, Texas

2. Project No.: 86-D-125

8. Brief physical description of project (contd.)

The addition and modification to the SCC will provide space to support the security operations which have expanded in size and scope of responsibilities. This space will provide for the following major needs: (a) uniform and equipment storage room to relieve overcrowding problems and the use of a temporary module, (b) exercise room to house equipment to be used by members of the rapid response team in a strenuous exercise and weight program on a daily basis at the plant, (c) weapons training room to conduct weapons training for various guard groups which is currently conducted in a rapid deployment vehicle garage after the vehicle is removed, (d) armored vehicle garage to house two vehicles designated as mobile command center vehicles--one vehicle is on hand and one is planned to be added in the future, and (e) enlargement of the muster/training room to accommodate the increase in guard force levels--the room serves as a briefing/debriefing area for each shift.

b. Subproject B - Emergency lighting upgrade and armored vehicle garage

The existing mercury vapor light fixtures, on eight 100-foot-tall light towers, will be replaced with nine (each) 2,000-watt incandescent light fixtures and nine (each) 400-watt high-pressure sodium light fixtures. These lights will only be used in emergency situations in order to assist in resolving security-related problems. The incandescent fixtures provide the "instant on" characteristics required in an emergency security situation. This subproject also provides for the rehabilitation of the above eight existing 100-foot-tall steel light towers which are in the weapons and high-explosives staging area. The existing ladder and walking-working surface of the towers do not comply with the existing safety standards.

An armored vehicle garage consisting of 625 square feet (25 feet by 25 feet) of floor space is required to handle existing and future armored vehicle requirements within the weapons and high-explosives staging area. The building will provide two bays with 10-foot by 12-foot electrically operated overhead doors and a space in the rear of the garage for weapons cleaning and inspection. The building will be constructed of reinforced masonry with a steel joist, metal deck, and built-up insulated roof. An electrical space heater will be required to maintain heat during the winter and no cooling will be required. There presently is no facility to house and protect an armored vehicle with loaded weapons in the area.

c. Subproject C - Administrative services facility

This subproject provides a new office building of approximately 31,000 square feet (44 feet by 216 feet) to be located at the Pantex Plant's east entrance which will house nonbadged personnel, such as vendor representatives.

This facility will house approximately ten support functions, most of which are presently being conducted in the existing administration building, located deep within the plant's boundary.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Phase II, Pantex Plant, Amarillo, Texas
2. Project No.: 86-D-125

8. Brief physical description of project (contd.)

The building will be constructed with a frame of steel columns and beams, steel joist, metal deck and built-up roof system, and a reinforced concrete masonry and face brick exterior. Interior walls will be constructed of steel studs and vinyl-covered gypsum board. Individual offices will be separated by 5-foot-high vinyl-covered movable partitions. All areas with the exception of the mechanical room, small parcel receiving area, and service representative work area will have an acoustical tile ceiling providing a minimum nine-foot ceiling height. Standard office furniture is included in this subproject.

Site work will include the construction of a sewer line and a water line loop meeting domestic requirements as well as fire protection requirements for the new facility. Access roads, parking area, landscaping, and an automatic lawn sprinkler system is planned.

Electrical service will be provided by the upgrading of an existing overhead power line.

d. Subproject D - Vehicle entrance guard station

This subproject consists of a hardened guard station, approximately 144 square feet (12 feet by 12 feet), and approximately 450 linear feet of a 24-foot-wide asphalt access road to an existing perimeter road and approximately 880 linear feet of a new 40-foot-wide asphalt surfaced road. Bullet-resistant glass and doors will be used in the station and gun ports will also be provided.

Construction materials will consist of cast-in-place concrete walls and structural steel tube columns supporting a precast concrete roof slab. Electrical power will be provided from an existing underground electrical duct system extended underground to a pad-mounted transformer located near the new facility.

The new access road will cross an existing sensor bed and modifications to the individual sector involved will be required. Electrically operated gates will be installed in the existing fence lines on both sides of the sensor bed and will be controlled from the new guard station and the existing guard tower. The station will include auxiliary equipment consisting of surveillance cameras, a water cooler, two radiation detectors, telephone, and weapons cabinet.

The FY 1987 funding will be utilized for the award of a construction contract for the four subprojects included in this project.

9. Purpose, justification of need for, and scope of project

In recognition of the continuing threat of international terrorism and the concern for the unique production capabilities of the Pantex Plant, the proposed measures to eliminate potential vulnerabilities to surprise attack and to assure that the

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Phase II, Pantex Plant, Amarillo, Texas

2. Project No.: 86-D-125

9. Purpose, justification of need for, and scope of project (contd.)

Pantex guard force is prepared and equipped to respond quickly and decisively to an aggressor force as characterized in the threat spectrum are required. The proposed construction projects for Pantex are necessary to correct some basic inadequacies in plant security and to enhance the detection and response capabilities of the guard force through improved lighting in the staging area and installation of a protective garage for armored vehicles.

a. Subproject A - Command center expansion

The Security Command Center (SCC) serves as the headquarters for the uniformed guard force. The facility provides space for administrative offices, communications center, armory, muster/training room, change rooms, and storage. The building is seal-hardened and would serve as the security operations command post in the event of an armed attack on the plant.

The command center was originally designed to accommodate 178 uniformed guards (156 male, 22 female). At present, there are 239 uniformed guards (223 male, 16 female) on the force. The security division predicts an estimated 345 uniformed guards by FY 1992. The growth in the security force can be attributed to various factors. Some of these are: construction escort demands, Department of Energy security directives, and plant security upgrades. Due to these personnel increases, the command center needs to be expanded in various areas.

The muster/training room serves as a briefing/debriefing area for each shift. All shift duties are discussed with the guards at the onset of each shift in the muster/training room. This room needs to be expanded to accommodate the increase in guard force levels.

Members of the rapid response team will be required to participate in a strenuous exercise and weight training program on a daily basis at the plant. This program will require additional area to house the necessary equipment.

The existing command center has three garage stalls which house two armored personnel carriers and a rapid response vehicle. Recently, one new vehicle designated as a mobile command center was added to the force. One more mobile command center vehicle is planned in the future. These vehicles are part of a rapid deployment force that would be needed at a moment's notice in the case of a plant intrusion. If the vehicles were kept outdoors, it is possible that in cold weather they would not start. In case of snow, the drifts could be such that the vehicles would have to be dug out to mobilize them. In the case of an emergency, the delay could be catastrophic.

The garage area is also currently utilized to present weapons training classes to various guard groups. To conduct a weapons training class, a rapid deployment vehicle is removed from the garage to provide adequate space. A separate area is required to house adequately a weapons training room.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Phase II, Pantex Plant, Amarillo, Texas

2. Project No.: 86-D-125

9. Purpose, justification of need for, and scope of project (contd.)

The security force must maintain an inventory of uniforms, overalls, coats, leather goods, and other related equipment. A temporary modular building is being used to provide storage space for this inventory. Space will be provided by this project for storage of this equipment and replace the temporary storage area.

Approximately 300 square feet of additional space will be provided in the communications room to support the expansion of the communication and closed-circuit television surveillance requirements.

b. Subproject B - Emergency lighting upgrade and armored vehicle garage

The weapons staging igloos and shipping facilities occupy approximately 120 acres. This area is currently protected by a double fence and sensor bed around its lighted perimeter. At present, due to the substandard climbing assemblies on the towers, safety considerations do not permit any maintenance of the existing mercury vapor light fixtures. This project will provide for the abandonment of the existing substandard climbing ladders and the addition to each of the eight towers, a climbing ladder attached to the outside of the tower that meets current safety standards.

Mercury vapor lights, though more efficient than incandescent, do not permit the immediate activation to light levels that are required for adequate response to an alarm. The proposed modification from mercury vapor lights to a combination of nine incandescent fixtures and nine high-pressure sodium fixtures per tower will provide the required footcandles immediately. Proper lighting is an absolute necessity to effective control and surveillance.

Present regulations require an armored vehicle with loaded weapons in place to be ready and staged within the weapons and high-explosive staging area. There is at present no facilities to house and protect the vehicle and weapons from severe weather, thus creating the potential for making both the vehicle and weapons inoperable due to temperature, moisture, and dust. The proposed garage will provide protection from the elements and the added reliability required of the vehicle and its weapons. Armored vehicles are an essential element of the special security response force at Pantex.

c. Subproject C - Administrative services facility

The increased concern over the possibility of attack or sabotage has prompted the DOE to propose removing administrative support and other support functions from an area adjacent to the production area. This proposal will significantly improve security control and boundary surveillance measures by eliminating a large number of uncleared personnel access to the central areas of Pantex. Removal of nonoperational accesses, in coordination with the improvements to badge and access control measures, will significantly reduce the chance of surprise penetration under pretense.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Phase II, Pantex Plant, Amarillo, Texas

2. Project No.: 86-D-125

9. Purpose, justification of need for, and scope of project (contd.)

Currently, it is necessary for all nonbadged personnel such as vendor representatives, those seeking employment, employees with lost or forgotten badges, relatives of employees with plant business, and official visitors, to go to the existing administrative facility area.

Since all the functions requiring access by the nonbadged personnel are housed in or near their existing administrative facility, security would be enhanced by relocating those unclassified activities that deal primarily with nonbadged personnel to the outer plant entrance. The delivery function could be improved by providing security escorts at the plant entrance for those deliveries requiring access to areas deep within the plant. By including areas in the new facility for service representatives to work on defective office equipment, etc., Credit Union offices, and by providing a small parcel receiving area, the need for penetration of nonbadged personnel deep within the plant area will be greatly reduced.

d. Subproject D - Vehicle entrance guard station

At the present time, there are three entrances to the classified manufacturing high-explosive and special nuclear materials operational area. Two guard station entrances are for personnel only while a third guard station entrance will allow vehicular traffic. The third guard station is located to permit vehicular traffic between four distinct areas.

(1) General plant area.
(2) Classified office and shop area of production line area.
(3) Classified manufacturing high-explosive and special nuclear material operational area.
(4) Classified plant area such as development, test fire, vehicle maintenance, and weapons staging.

Since the third guard station (vehicle entrance) is the only entrance/exit for all these different areas, the vehicle congestion often is a problem. All commercial trucks must go through this entrance to deliver the material and supplies to the warehouse. All weapon movements between the manufacturing area and the staging area must pass through this point. However, this point is adjacent to the unsecured area of the plant; i.e., the cafeteria parking lot and access road. There is a risk in that it is possible for an individual to drive a vehicle through the fence and into a shipment of weapons. A new station that is removed from the unsecured area is needed to eliminate this possibility. It will also permit smoother traffic flow through the area.

This subproject is required to enhance the movement security of weapons and components between areas and also to eliminate the congestion which currently exists at the only other vehicular gate.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Phase II, Pantex Plant, Amarillo, Texas

2. Project No.: 86-D-125

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 18 percent of construction costs, item b		$ 1,300
b. Construction costs		7,300
(1) Improvements to land	$ 1,060	
(2) Buildings (4 buildings)	4,110	
(3) Other structures (rehabilitate towers)	65	
(4) Utilities	1,705	
(5) Building equipment	360	
Subtotal		$ 8,600
c. Contingency at approximately 16 percent of above costs		1,400
Total estimated cost		$10,000

11. Method of performance

It is recommended that all work be accomplished as follows.

a. Design and engineering (Titles I and II) will be on the basis of a negotiated fixed-price contract administered by DOE to an architect-engineer. Inspection (Title III) services and construction management will be administered by a designated construction manager. Partial Title III services will be provided by the selected architect-engineer.

b. Construction will be accomplished by an outside construction contractor operating under a fixed-price, lump-sum contract to be awarded on the basis of competitive bids and administered by the designated construction manager. Contractor support such as temporary security barricades and Government-supplied items will be furnished and installed by the operating contractor, Mason & Hanger-Silas Mason Co., Inc.

c. Final connections of new communications and detection systems for the facilities will be accomplished by the operating contractor, Mason & Hanger-Silas Mason Co., Inc.

d. Certain items of standard equipment will be procured and installed by the operating contractor, Mason & Hanger-Silas Mason Co., Inc. This includes such items as office furniture, tables, shelving, etc.

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a/ The above estimates are based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Phase II, Pantex Plant, Amarillo, Texas

2. Project No.: 86-D-125

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1986	FY 1987	FY 1988	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 0	$ 1,000	$ 5,000	$ 4,000	$10,000
Total facility costs	0	1,000	5,000	4,000	10,000
2. Other project funding					
(a) Other project related costs	50	0	0	0	50
Total other project funding	50	0	0	0	50
Total project funding (items 1 and 2)	$ 50	$ 1,000	$ 5,000	$ 4,000	$10,050

b. Other related funding requirements (estimated life of project: 25 years)

1. Facility operating costs	$ 125
2. Programmatic operating expenses directly related to the facility	725 a/
Total other related costs	$ 850

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
  1. Other project funding
    (a) Conceptual design

The cost of the conceptual design prepared for this project was $50,000.

b. Total related funding requirements
  1. Facility operating costs

Facility operating costs of $125,000 are projected to cover maintenance, janitorial, and utilities for the project.

  2. Programmatic operating expenses directly related to the facility

Programmatic operating costs and estimated manpower cost required to support this project.

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a/ Excludes direct material.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Tritium loading facility replacement, Savannah River Plant, Aiken, South Carolina
2. Project No.: 86-D-130
3. Date A-E work initiated: 1st Qtr. FY 1986
3a. Date physical construction starts: 1st Qtr. FY 1987
4. Date construction ends: 3rd Qtr. FY 1990
5. Previous cost estimate: $120,000 Date: 1/85
6. Current cost estimate: $120,000 Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$ 5,000	$ 5,000	$ 5,000	$ 4,700
1986 Sequestered	(0)	(300)	(300)	(300)
1987	30,000	30,000	30,000	29,000
1988	51,500	51,500	51,500	45,000
1989	33,500	33,800	33,800	26,000
1990	0	0	0	15,300

8. Brief physical description of project

This project provides funds for the design and construction of a new tritium reservoir loading facility at the Savannah River Plant, Aiken, South Carolina.

The new tritium reservoir loading facility will be a maximum resistance, reinforced concrete structure, located adjacent to the existing tritium area buildings. The new structure will be approximately 200 feet long, 175 feet wide, and 23 feet high. An attached standard construction structure will house noncritical support facilities such as change rooms, storage areas, and noncritical support equipment.

The new tritium facility will be designed and constructed in compliance with Department of Energy (DOE) Order 6430.1. The facility will be designed around modular process units using digital control systems for automated procedural actions. The intent of the design in the loading area will be to incorporate designed features for future expansion and renovation. All projected capabilities and capacities will be allowed for in the design. However, only those capabilities and capacities currently scheduled will be installed. State-of-the-art security, accountability, and physical protection designs will be

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Tritium loading facility replacement, Savannah River Plant, Aiken, South Carolina
2. Project No.: 86-D-130

8. Brief physical description of project (contd.)

incorporated in the new tritium facility. Advanced tritium confinement systems will be installed as an integral part of the process such that essentially no tritium will escape to the environment during normal operation of this facility. Critical support systems such as ventilation, fire protection, and electrical systems will be designed in compliance with the objectives stated above. Where necessary, special safety features and the quality assurance program will be employed to ensure that critical systems are designed, constructed, and installed in accordance with the prescribed criteria. The conceptual design for this project has produced a comprehensive description of all new process systems to be installed and a building layout necessary to accommodate these systems. The requested FY 1987 funding will be used for process design, equipment procurement, and construction.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to replace poor and inadequate tritium reservoir loading facilities with a safer, more secure building, "state-of-the-art" equipment, and new process technology needed to support the weapon production schedule in FY 1990 and beyond.

Tritium, a radioactive isotope of hydrogen, is created, purified, and loaded in shipping containers called reservoirs through various facilities at the Savannah River Plant. The existing tritium reservoir loading facility was built in the late 1950's to support a then small, but important part, of the nation's nuclear weapons defense. Over the past 20 years, the nature and volume of tritium reservoir loadings have changed. The once small, essentially laboratory sized, reservoir loading process was retrofitted, expanded, and enhanced into the present day operation. These expansions, revisions, and added features maintained the tritium reservoir loading facility current with military support applications while requiring minimum capital expenditures for each new product.

By the end of this decade, available resources to support the projected quantity and type of unique tritium reservoirs will be expended. Thus, the continuing need to load new unique reservoirs, and the heightened awareness for prompt reprocessing of current use reservoirs, will be beyond the capacity of the existing facility. This project is required to meet scheduled DOE requirements in FY 1990 and beyond and to incorporate advanced "state-of-the-art" tritium loading technology in the new structure.

This project is justified on the basis of required tritium reservoir production capacity and the incorporation of new technology. Work must begin in FY 1986 to assure meeting nuclear weapon production goals through the end of the century.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Tritium loading facility replacement, Savannah River Plant, Aiken, South Carolina

2. Project No.: 86-D-130

9. Purpose, justification of need for, and scope of project (contd.)

Capacity

The existing tritium loading facility is not capable of supporting another expansion. Physical limitations and the already extended condition of process support equipment prevents expansion. It is not cost effective or practical to build a separate small tritium loading facility to support future capacity need. The existing tritium reservoir loading facilities are beyond practical rejuvenation because of the aged condition of the whole process and its support equipment. It is not practicable or economical to renovate or retrofit the existing facility and yet meet scheduled production requirements. The complex process and instrument interconnections, which originally made this facility responsive to product and schedule changes, cannot be revised or appended without an extended production outage of several years.

New technology

The new facility will employ recently developed process technology along with engineered systems for physical protection and security. Material control, process control, and nuclear materials accountability will be installed as designed features of the loading process. Significant yearly operating cost savings can be realized by incorporating commercially available designs and equipment that are energy efficient.

Recent DOE-directed programs have developed metal hydride storage, pumping, compression, and separation of hydrogen isotopes to the point where that technology is considered standard. Developments in other areas such as instrumentation, piping connections, personnel protection, and digital control systems now make significant reductions in the size and quantity of process equipment possible. As a benefit, improved containment and virtual elimination of atmospheric releases from the operation will result. These available concepts and systems will be incorporated in the new loading facility. The facilities provided by this project will continue Savannah River Plant's goal of meeting all DOE objectives in a cost-effective manner while minimizing the exposure to operating personnel and releases to the environment.

The combined effect of new equipment and new technology will allow a 25 percent reassignment of the current reservoir loading manpower requirements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Tritium loading facility replacement, Savannah River Plant, Aiken, South Carolina

2. Project No.: 86-D-130

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 22 percent of construction costs, item b		$ 20,000
b. Construction costs		88,870
(1) Buildings	$ 8,719	
(2) Special facilities	37,970	
(3) Electrical	12,003	
(4) Instrumentation including computer control equipment	30,178	
c. Removal costs		130
Subtotal		109,000
d. Contingency at approximately 10 percent of above costs		11,000
Total estimated cost		$120,000

11. Method of performance

The operating contractor, E.I. du Pont de Nemours and Company, will perform design and engineering. The operating contractor will accomplish construction and procurement, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Tritium loading facility replacement,
Savannah River Plant, Aiken, South Carolina

2. Project No.: 86-D-130

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 4,700	$29,000	$45,000	$26,000	$15,300	$120,000
Total facility costs	$ 4,700	$29,000	$45,000	$26,000	$15,300	$120,000
2. Other project funding						
(a) Conceptual design costs	$ 250	$ 0	$ 0	$ 0	$ 0	$ 250
(b) Other project related costs	2,400	1,000	1,000	1,200	0	5,600
Total other project funding	$ 2,650	1,000	1,000	1,200	$ 0	5,850
Total project funding (items 1 and 2)	$ 7,350	$30,000	$46,000	$27,200	$15,300	$125,850

b. Other related funding requirements (estimated life of project: 25 years)

1. Facility operating costs	$ 4,000
2. Programmatic operating expenses directly related to the facility	38,850
Total other related costs	$ 42,850

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Total facility costs
      The construction line item will provide a complete facility.

   2. Other project costs
      (a) Conceptual design for this project was prepared by the operating contractor at a cost of $250,000.

      (b) Other project-related costs include construction liaison, safety analysis report preparation, startup, procedure development, and initial facility certification.

b. Other related annual costs
   1. Facility operating costs
      Approximately $4,000,000 per year will be required to cover the cost of utilities, maintenance, janitorial services, and related overhead costs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Tritium loading facility replacement, Savannah River Plant, Aiken, South Carolina	2. Project No.: 86-D-130

13. Narrative explanation of total project funding and other related funding requirements (contd.)

2. Programmatic operating expenses directly related to the facility
The average annual incremental cost of direct labor, procurements, and overhead is estimated at $36,850,000 per year.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Enriched uranium recovery improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 85-D-112

3. Date A-E work initiated: 2nd Qtr. FY 1985

3a. Date physical construction starts: 1st Qtr. FY 1986

4. Date construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: $52,000
Date: 1/85

6. Current cost estimate: $52,000
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$ 4,500	$ 4,500	$ 4,500	$ 3,537
1986	15,300	13,300	13,300	9,800
1986 Sequestered	(0)	(800)	(800)	(0)
1987	19,800	21,800	21,800	13,700
1988	12,400	13,200	13,200	17,200
1989	0	0	0	7,763

8. Brief physical description of project

This project will upgrade significant facets of the weapons program enriched uranium recovery facility, including process reliability, nuclear criticality safety, production capacity, special nuclear materials (SNM) safeguards, and uranium containment. Production scrap processing equipment will be provided to receive uranium-bearing waste from various sources throughout the plant, sort the material according to type, and then shred and compact the combustibles.

A two-story building addition of approximately 1,500 square feet will be built and a two-stage incinerator will be installed, complete with off-gas cleanup and ash removal accessories, to burn combustible contaminated waste. A series of new high-capacity leaching columns and tray dissolvers will leach uranium from the ash and other contaminated solids. A new secondary uranium processing operation will also be provided to recover virtually all residual uranium in the solids after the primary treatment is complete. New vertical storage tanks and accountability tanks will be provided to enhance uranium processing and accountability. Clarification and purification equipment such as high speed centrifuges will be added to the

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Enriched uranium recovery improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 85-D-112

8. Brief physical description of project (contd.)

main uranium flow line to allow control and removal of solids and organics that currently interfere with purification operations. This equipment will require an addition of a 3,500-square-foot penthouse to the existing building to provide head room for installation of the vertical tanks. A central data acquisition computer room of approximately 1,125 square feet and two local control rooms of approximately 2,000 square feet total including modifications of approximately 1,700 square feet of existing space will be provided.

Major ventilation and humidity control equipment, including air dehumidifiers, fans, ducts, and exhaust stacks, as well as physical isolation of particularly "contaminated" processes, will be provided to reduce the amount of airborne and surface uranium activity. The expanded use of glove boxes and hoods will be emphasized. Also, applicable facility additions and modifications will be provided for the control of environmental effects associated with enriched uranium recovery operations.

A new contamination control facility of 1,125 square feet new area and about 2,500 square feet of existing area will be provided to control uranium "trackout" from the operating area. This facility will feature physically distinct and well-defined clean/contaminated zones with a contaminated shoe park, shoe scuff, and laboratory coat storage area; personnel monitors; and hand wash station. A new decontamination facility will be provided to clean equipment removed from the production area for maintenance or disposal. This facility will feature both small and large disassembly and cleaning hoods with monorail cranes and liquid handling ancillaries such as pumps, filters, and storage tanks. A new computer will be housed in a control facility of approximately 300 square feet.

Major renovations will be made to existing uranium recovery and purification operations by the addition of microprocessor based instrumentation and controls and by modification of equipment and associated peripherals. Existing electrical services will be upgraded to meet the increased process workloads.

The requested FY 1987 funding will be used for engineering design and inspection, for procurement of equipment, and for installation of process facilities.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to upgrade existing enriched uranium recovery facilities to the level necessary to provide for continued reliable and safe operations, for protection of personnel and the environment, and for compliance with standards covering control and accountability of SNM. The existing facility was built more than 25 years ago using then state-of-the-art technology. Now, most of the technology and equipment is old. Significant improvements are essential for safety in operations and for expected future production requirements. This project will provide significant improvements in the areas of: (1) production reliability and maintenance of capacity; (2) criticality safety; (3) nuclear materials control accountability and safeguards; and (4) personnel and environmental protection.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Enriched uranium recovery improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 85-D-112

9. Purpose, justification of need for, and scope of project (contd.)

Function of enriched uranium recovery facilities

The Y-12 Plant is the primary source of highly enriched uranium (93 percent U-235) nuclear weapons components and subassemblies for the nuclear weapons stockpile of the United States. The enriched uranium for new production comes from the disassembly of obsolete weapons. Rough metal forms are first produced in a casting operation using graphite crucibles. Some of the cast metal is then rolled and hot formed. The resulting parts are ultimately machined to final dimensions. The manufacturing process produces a considerable quantity of uranium scrap as casting dross, metal turnings, contaminated graphite, and various contaminated residues. Impure uranium contained in this scrap is recovered in a unique chemical reprocessing facility for reintroduction into the weapons component production stream.

The facility to be improved represents the only enriched uranium recovery capability of any size in the United States. Since there is currently no operational capability for converting material withdrawn from the gaseous diffusion plants to weapons grade metal, this recovery facility represents the only source of makeup material for new nuclear warheads. Furthermore, since impurities are stripped from the scrap uranium during chemical reprocessing, this recovery facility also serves to maintain the minimum overall purity and neutronic characteristics of the weapons uranium stockpile. The highly enriched uranium that is recovered from the production scrap every year is worth hundreds of millions of dollars. Thus, it is essential that the reliability of the Y-12 chemical recovery operation be maintained since economics and material availability and purity requirements demand that the uranium scrap generated during the production operations be reprocessed.

Reliability of operations and maintenance of capacity

The current chemical recovery facility was designed on the basis of technical and administrative standards and practices which were in effect over 25 years ago. The original process and equipment were well chosen and engineered at that time using what was then state-of-the-art technology. Most of the equipment in the facility today is the original equipment. It has seen very few alterations and technological improvements in the intervening years. The chemicals used in the various recovery processes are highly corrosive and, as a result, much of the equipment requires excessive maintenance. The use of automatic control instrumentation is very limited and the instruments used represent obsolete technology. Thus, the recovery facility is reaching the end of its useful life and its ability to meet anticipated production requirements during the 1980's and beyond must be considered marginal.

In addition to the need for improving production reliability, significant improvements are necessary to insure that this facility can be operated under adequate conditions of uranium accountability, environmental and personnel protection, and criticality safety.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Enriched uranium recovery improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 85-D-112

9. Purpose, justification of need for, and scope of project (contd.)

Criticality safety

The most important concern with the adequacy of the present facilities deals with nuclear safety. In view of the severe consequences of an uncontrolled nuclear reaction, nuclear criticality safety is a major concern in all enriched uranium operations and, in particular, those involving large quantities of uranium bearing solutions. Strict administrative controls are one of the major tools used at Y-12 to assure nuclear criticality safety. As the equipment continues to age and deteriorate, the number of incidents requiring actions by process operators will increase. Also, undetected leaks or other problems which could result in a criticality incident are more likely to occur. Upgrading of current facilities is necessary to increase the integrity of pipes and processing equipment, replace batch processing with continuous processing, increase the use of geometrically safe equipment, add process control and monitoring instrumentation, and reduce the need for opening of storage tanks for cleaning. All of these upgrading actions will serve to reduce reliance on administrative control and significantly reduce the risk of incurring a criticality incident.

Nuclear materials control accountability

Current equipment configurations, instrumentation, and some elements of process capability are inadequate to measure the enriched uranium inventory to the degree of precision required by current accountability and safeguards criteria. Significant uncertainties in inventory are inherent due to the fact that uranium solutions are stored in a number of small diameter horizontal tanks whose level cannot be accurately determined and it is very difficult to obtain a representative sample. A small error in determining the level of solution in storage tanks or a nonrepresentative sample results in a sizeable inventory difference.

Another area of uncertainty and delay in accounting for enriched uranium on a monthly basis is in determining the uranium content of various types of residues. Facilities improvements are required to provide additional capability for processing residues to a measurable form in a timely manner, thereby minimizing the backlog of residues.

As the equipment continues to age and deteriorate, there is an increasing potential for major losses of enriched uranium due to leaks and other problems with current equipment and technology.

Personnel and environmental protection

Continued operation of existing facilities is of major concern from the standpoint of protection of personnel and the environment. While current standards are being met, personnel exposures and effluent releases have in some cases been at higher-than-desired levels and generally show upward trends. This is due in part to increased production throughput, but the major cause is the age and condition of the equipment and the need for more and more maintenance which greatly increases personnel exposures and the potential for uranium releases.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Enriched uranium recovery improvements, Y-12 Plant, Oak Ridge, Tennessee
2. Project No.: 85-D-112

9. Purpose, justification of need for, and scope of project (contd.)

Deficiencies in ventilation systems, decontamination facilities, and process equipment are such that the facility as a whole does not provide an adequate margin of safety necessary to maintain a good health physics environment. With continued deterioration of the equipment, there is a possibility in the future that it will not be possible to meet personnel and environmental protection standards through the use of operating controls and limitations. More stringent standards are highly likely in the near future which will further increase the difficulty of compliance.

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 21 percent of construction costs, item b ...		$ 7,500
b. Construction costs		35,600
(1) Building additions	$ 2,100	
(2) Special process facilities for uranium recovery processes	33,500	
Subtotal		43,100
c. Contingency at approximately 20 percent of above costs		8,900
Total estimated cost		$52,000

11. Method of performance

To the extent feasible, design will be accomplished on the basis of a negotiated architect-engineer contract. Inspection will be performed by the operating contractor. Construction, installation, and procurement will be accomplished by the cost-plus-award-fee contractor and the operating contractor.

Project implementation must be structured to ensure continuity of existing production operations; maintenance of the SNM safeguards and accountability capability; and the preservation of criticality, personnel, and environmental safety.

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a/ Estimate is based on a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Enriched uranium recovery improvements,
Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 88-D-112

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$13,337	$13,700	$17,200	$ 7,763	$52,000
Total facility costs	13,337	13,700	17,200	7,763	52,000
2. Other project funding					
(a) Conceptual design	2,085	0	0	0	2,085
(b) Process development effort	4,865	0	0	0	4,865
Total other project funding	6,950	0	0	0	6,950
Total project funding (items 1 and 2)	$20,287	$13,700	$17,200	$ 7,763	$58,950

b. Other related funding requirements (estimated life of project: 25 years)

1. Facility operating costs	$ 1,300
2. Programmatic operating expenses directly related to the facility	3,050
Total other related annual funding requirements	$ 4,350

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other related project funding

(a) Conceptual design for this project has been completed in two stages. The initial conceptual design cost $663,000. Subsequent pre-title I activity intended to reduce cost uncertainties and improve the completion schedule was completed at a cost of $1,422,000.

(b) Process development effort necessary to establish the parameters and criteria for design of this project was completed prior to FY 1987 by the operating contractor at a cost of $4,865,000. The work includes investigation of an alternative residue treatment process and extraction column controls. This development effort, having been completed, will not constrain the construction of this project. Attractive, alternative technologies have been identified in several cases which offer the potential for large incremental performance gains over the base design. The unique application of these processes and systems to uranium recovery involve technical uncertainties which will be assessed prior to start of project design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Enriched uranium recovery improvements,
Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 85-D-112

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Other related funding requirements

1. Facility operating costs

Annual facility operating costs include utilities, maintenance, janitorial services, and related overhead.

2. Programmatic operating expenses directly related to the facility

Operating expenses directly related to the new facility will cover direct labor, material, supplies, and related overhead.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Power plant and steam distribution system, Pantex Plant, Amarillo, Texas

2. Project No.: 85-D-113

3. Date A-E work initiated: 3rd Qtr. FY 1981

3a. Date physical construction starts: 4th Qtr. FY 1985

4. Date construction ends: 2nd Qtr. FY 1991

5. Previous cost estimate: $30,400
Less Design Funding: 2,000 a/
$28,400
Date: 1/85

6. Current cost estimate: $29,200
Less Design Funding: 2,000 a/
$27,200
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$ 4,500	$ 4,500	$ 4,500	$ 60
1986	18,500	13,500	13,500	5,640
1986 Sequestered	(0)	(810)	(810)	(0)
1987	2,600	7,600	7,600	5,200
1988	0	810	810	10,300
1989	0	0	0	4,300
1990	1,600	1,600	1,600	1,000
1991	0	0	0	700

8. Brief physical description of project

This project provides for the construction of a new central power plant equipped for the cogeneration of electric power, a new steam distribution and condensate return system, and demolition and disposal of the existing steam plant and distribution system.

The new power plant will be designed for natural gas as the primary fuel and will provide for conversion to coal at a later date as conditions warrant. Current availability of natural gas in the Amarillo area and overall life cycle cost evaluation

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a/ A significant part of the design for this project was completed using FY 1981 and FY 1982 funding provided by the Department of Energy (DOE) In-House Energy Management Program.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Power plant and steam distribution system, Pantex Plant, Amarillo, Texas

2. Project No.: 85-D-113

8. Brief physical description of project (contd.)

strongly favors natural gas as the primary fuel. A 600,000-gallon supply of reserve fuel oil is presently available at Pantex for emergency boiler fuel. Two of the boilers will be designed to accommodate later conversion to coal use, but no equipment for firing coal is included in this project. The same two boilers will be designed for high pressure steam for use if it is economical to add congeneration in the future.

The boiler plant will house two high pressure steam boilers, each rated at 50,000 pounds per hour, and two low pressure boilers, each rated at 25,000 pounds per hour. The high pressure boilers will be designed to accept a superheater assembly in the future if a congeneration system is found to be economically feasible. The plant will be centrally located between major heating and cooling loads on the site. The power plant building will be approximately 82 feet by 162 feet by 60 feet high, with four stacks. The building will be a steel frame structure with insulated metal panels.

A new steam distribution and condensate return system using 400°F steam will be built. A portion of the new steam distribution system will be installed in 6,800 feet of new concrete trench at ground surface level. Approximately 43,000 feet of insulated steam pipe will be installed with necessary overhead supports, manholes, valves, and building connections.

Provisions will be made for demineralizing and treating water from an existing well. A condensate storage tank will be built. The existing sanitary sewer will be extended to the power plant site.

Design of this project was begun and substantial progress made using FY 1981 and FY 1982 funds provided by the DOE In-House Energy Management Program. Design of the steam distribution system has been completed. Design of the power plant, Title II, engineering, will be completed in April, FY 1987. Due to the excessive asbestos currently in place in the old power house, some architect-engineer (AE) effort will be associated with this extensive demolition work. Such items as surveys, drawings, and photographs will be required in order to safely demolish the old powerhouse. This AE effort is scheduled for completion in FY 1989. Construction of the power plant is scheduled for completion, check-out, and start-up in the first quarter of FY 1990, with demolition and disposal of existing steam plant and distribution system to be completed in the second quarter of FY 1991. The requested FY 1987 funding will be used to complete major procurements and construction.

9. Purpose, justification of need for, and scope of project

Reliability is the primary and overriding factor which justifies immediate funding for this project. Pantex weapon production requires steam for continued operation; failure of the steam plant or distribution system could shut down production activities important to national security for as much as six months. Design of the project is in progress. The requested funding will permit completion of a reliable system late in 1990.

The existing Pantex steam plant and steam distribution systems are overaged, inefficient, and of seriously questionable reliability. The boiler plant, built in the 1940's under wartime limitations, has long exceeded the 25-year expected service

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Power plant and steam distribution system, Pantex Plant, Amarillo, Texas	2. Project No.: 85-D-113

9. Purpose, justification of need for, and scope of project (contd.)

life. Replacement parts are often not available and require custom manufacturing with lead times of several months. Failure of this plant could result in a shutdown of Pantex weapon production activities that could last several months. Over 50 percent of the steam energy produced in the boilers is lost due to inefficiencies and condensate losses in the steam distribution system.

The inefficiency in the steam distribution system is the result of a gradual shift in the technique for manufacturing of high explosive (HE) components for nuclear weapons changing from melting and casting the required shapes to precision machining. In early years, most of the HE parts were formed by casting after the HE had been melted by exposure to steam. The large amounts of steam needed were transmitted in 18-inch pipelines. Condensate from this operation was, in most cases, not suitable for reuse because of HE contamination. Condensate return lines were not provided from areas where the quality of the condensate was questionable.

With progress in weapon design and production technology, HE component fabrication gradually evolved from molten casting to precision machining of the explosive shapes needed in newer weapons. The use of steam in the production areas has now decreased substantially, in some areas to about 10 percent of the 18-inch line capacity, with consequent very slow flow of steam in the lines. An engineering analysis of the energy losses in the existing steam distribution system shows a majority of the steam energy produced in the boilers is lost in transmission. Several factors are involved including oversized steam lines, deteriorated insulation, condensate losses, and undetected steam leaks. Considering the relatively low cost of fuel ten years ago, replacement of the steam plant and distribution system would have shown a rather unattractive payout. Dramatic increases in fuel costs over the past few years now show that elimination of this energy loss can be justified on economics alone. Projected fuel costs show that future energy losses using the existing steam distribution system would be several million dollars per year. This project, providing a new high-pressure steam plant and a new steam distribution system, is economically justified. A life-cycle cost analysis shows a 11.8-year payback and a savings-to-investment ratio of 1.768 using a projected 25-year service life. It should be noted that the steam plant reliability will greatly increase in addition to the economic justification.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Power plant and steam distribution system, Pantex Plant, Amarillo, Texas

2. Project No.: 85-D-113

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 8 percent of construction costs, item b		$ 1,680 b/
b. Construction costs		20,330
(1) Improvements to land	$ 400	
(2) Buildings, including boiler house	7,930	
(3) Special facilities, including boiler and auxiliary equipment	5,050	
(4) Utilities, including steam distribution system	6,950	
c. Removal cost less salvage (existing power plant and steam lines)		2,350
Subtotal		24,360
d. Contingency at 12 percent of above costs		2,840
Total estimated cost		$27,200

11. Method of performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction will be accomplished by a fixed-price contract awarded on the basis of competitive bids. Procurement support and relocation of existing equipment will be performed by the operating contractor.

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a/ Based upon essentially completed design of steam distribution system and partially completed design of steam plant.

b/ Excludes $2,000,000 provided by Department of Energy In-House Energy Management Program in prior years for pre-Title I studies and partial design of this project.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Power plant and steam distribution system, Pantex Plant, Amarillo, Texas

2. Project No.: 85-D-113

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	Total
a. Total project funding							
1. Total facility costs							
(a) Construction line item	$ 5,700	$ 5,200	$10,300	$ 4,300	$ 1,000	$ 700	$27,200
(b) Partial design	2,000	0	0	0	0	0	2,000
Total facility costs	7,700	5,200	10,300	4,300	1,000	700	29,200
2. Other project funding							
(a) Conceptual design costs	35	0	0	0	0	0	35
Total other project funding	35	0	0	0	0	0	35
Total project funding (items 1 and 2)	$ 7,735	$ 5,200	$10,300	$ 4,300	$ 1,000	$ 700	$29,235

b. Other related funding requirements (estimated life of project: 25 years)

1. Facility operating costs	$ 5,305
Total other related costs	$ 5,305

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
Conceptual design for this project was prepared by the operating contractor at a cost of $35,000.

b. Other related funding requirements
It is estimated that the programmatic life of this project is 25 years.

1. Facility operating costs

Facility operating costs of $5,305,000 annually includes the cost of operating labor, equipment maintenance, supplies, and fuel. The approximate fuel cost is $4,253,000 per year.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Renovate plutonium building utility systems, Rocky Flats Plant, Golden, Colorado

2. Project No.: 85-D-[illegible]

3. Date A-E work initiated: 2nd Qtr., FY 1985

3a. Date physical construction starts: 4th Qtr., FY 1985

4. Date construction ends: 4th Qtr., FY 1989

5. Previous cost estimate: $35,000
Date: 1/85

6. Current cost estimate: $35,700
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$ 2,000	$ 2,000	$ 2,000	$ 40
1986	17,700	17,700	17,700	3,000
1986 Sequestered	(0)	([illegible])	([illegible])	(0)
1987	16,000	16,000	16,000	15,000
1988	0	1,000	1,000	8,000
1989	0	0	0	2,700

8. Brief physical description of project

This project will renovate or replace extensively deteriorated and obsolete utility equipment in the original plutonium processing complex which consists of three buildings--the Plutonium Recovery Facility, Building 771; the Nuclear Waste Packaging Facility, Building 771-C; and the Waste Treatment Plant, Building 774.

In the Plutonium Recovery Facility, modifications will be made to the contaminated ventilation system including addition of fans, motors, controls, fire alarms, fire suppression systems, and replacement of existing air handling equipment. The main exhaust plenum will be renovated. A stainless steel liner will be installed inside the existing concrete plenum chamber. The stainless steel plenum will be partitioned into three separate sections fitted to a common manifold. Each section will have air-handling capacity of approximately 125,000 cubic feet per minute. Two existing airlocks will be modified and a new control airlock added. Breathing air stations and communications equipment will be provided for each airlock. The first stage filter frames will be replaced. Existing pipe chases will be isolated from the plenum interior by stainless steel sheet metal enclosures. Air flow measurement equipment and inlet environmental monitoring instrumentation will be installed to measure moisture content, hydrogen fluoride, and nitrous oxide gases. Fire protection conduit and piping and lighting will be

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Renovate plutonium building utility systems, Rocky Flats Plant, Golden, Colorado

2. Project No.: 85-D-115

6. Brief physical description of project (contd.)

relocated. Five main exhaust fan motors and controls will be replaced. The existing exhaust tunnel and stack will be replaced. The main trunk exhaust duct will be replaced. Parts of the existing room and glove box exhaust air duct system will be replaced. The modifications to be completed on the Plutonium Recovery Building will include replacing two substation transformers, increasing the capacity of the existing uninterruptible power supply, and replacing control systems on the exit heating, ventilating, and air-conditioning (HVAC) system. A new HVAC manifolded supply system will be installed. The compressed air system, steam distribution system, cooling water system, and sanitary and process drain vent filters will be modified.

In the Nuclear Waste Packaging Facility, the existing air supply and exhaust systems will be renovated. An additional filter stage will be installed. New heat coils will be installed in the air supply system and air conditioning will be provided.

In the Waste Treatment Plant, heating coils in the existing air supply system will be replaced and controls on the air exhaust system will be replaced.

The requested FY 1987 funding will be used to complete this project.

7. Purpose, justification of need for, and scope of project

The purpose of this project is to modify existing utility systems within the three-building plutonium processing complex to achieve a safe, dependable operating condition necessary to support continued use of these buildings in the future. The decision to upgrade these buildings is based on the Rocky Flats Long-Range Study which shows that the buildings are structurally adequate and can be renovated more economically than constructing new facilities.

An in-depth review of the current and projected use for the complex indicates that these facilities must continue in operation to support future workload projections. The facilities are approximately 30 years old, extensively deteriorated, and have been damaged by continuous service under corrosive conditions. Current projections show that the old Plutonium Recovery Facility will need to remain totally operational until about 1990 to handle processing not scheduled for transfer to the new Plutonium Waste Recovery Facility.

The main exhaust plenum in the Plutonium Recovery Facility has been subjected to highly corrosive acid fumes for 30 years and to a fire in 1957 which extensively damaged the first stage filter frames. Concrete subjected to acid fumes has lost its strength and has begun to crumble. The first stage filter frames were badly warped in the 1957 fire and, although repaired, are of inferior quality. Leaks in pipe chase liners could provide a direct bypass of both filter stages. While no leaks are known to exist, the liners are extensively corroded. Plutonium emissions, although well within safety limits, have shown an upward trend over recent years.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Renovate plutonium building utility systems, Rocky Flats Plant, Golden, Colorado

2. Project No.: 85-D-115

9. Purpose, justification of need for, and scope of project (contd.)

There is a significant potential risk of failure in the extensively deteriorated building utility systems in the three-building plutonium processing complex at Rocky Flats. There is concern that the increased throughput that will be necessary may result in a breakdown of these old ventilation systems and the potential release of plutonium contamination inside and possibly outside the facilities. The concerns are based upon frequency of repairs to these facilities which have been subjected to highly corrosive acid fumes. Current monitoring of exhaust air from this complex is showing an increasing frequency of radioactive "spikes" associated with minimal disturbances of the system during maintenance and repair. These emissions currently remain within acceptable safety limits. However, a significant disturbance could potentially present the Rocky Flats Plant with a plutonium release which could interrupt nuclear weapon production for several months. The operators of these facilities judge that a one-year delay in completing this project would substantially increase the potential for radioactivity releases.

An in-depth review of the current and future need for this plutonium processing complex has been made by the Department of Energy (DOE). All present research and development operations will remain in this three-building complex. The need for processing and recovery of special plutonium residues to support the weapon design laboratories will continue to exist after all recovery operations are transferred to the new facility. Based on the projected weapons production workload, it is expected that this complex will remain fully operational for plutonium recovery for at least 10 years after completion of this project.

This project would correct all known deficiencies in the utility systems. An additional stage of filtration will be added to meet health, safety, and environmental requirements. Significant improvements in operations and maintenance are expected as a result of this project.

The total estimated cost of this project has been reduced by $500,000 as a result of reduced escalation rates and reduced labor requirements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Renovate plutonium building utility systems, Rocky Flats Plant, Golden, Colorado

2. Project No.: 85-D-115

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 15 percent of construction costs, item b		$ 3,300
b. Construction costs		22,100
(1) Removal of existing equipment	$ 4,800	
(2) Procurement and installation of new equipment	17,300	
c. Standard equipment		3,800
Subtotal		29,200
d. Contingency at 19 percent of above costs		5,900 b/
Total estimated cost		$35,100

11. Method of performance

Design will be performed under a negotiated architect-engineer contract. Construction will be performed by an onsite contractor under an existing cost-plus-fixed-fee contract. Inspection of construction and procurement will be performed by the operating contractor.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 9,066	$14,800	$ 8,500	$ 2,734	$35,100
Total facility costs	9,066	14,800	8,500	2,734	35,100
2. Other project funding					
(a) Conceptual design costs	90	0	0	0	90
(b) Radiation monitoring	200	300	300	200	1,000
Total other project funding	290	300	300	200	1,090
Total project funding (items 1 and 2)	$ 9,356	$ 15,100	$ 8,800	$ 2,934	$36,190

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a/ Based upon completed conceptual design.

b/ Contingency applies to work to be performed during FY 1986, FY 1987, FY 1988, and FY 1989. A relatively high contingency is required to cover unanticipated costs associated with unknown contamination in the existing process facilities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Renovate plutonium building utility systems, Rocky Flats Plant, Golden, Colorado

2. Project No.: 85-D-115

12. Funding schedule of project funding and other related funding requirements

b. Other related funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ 2,800
2. Programmatic operating expenses directly related to the facility	0
Total other related costs	$ 2,800

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design costs

The conceptual design for this project was prepared by the operating contractor at a cost of $90,000.

(b) Radiation monitoring

The operating contractor will provide the necessary manpower equipment and material during construction to perform all radiation safety monitoring, to perform the necessary decontamination as the work progresses, and to prepare required safety analysis reports after construction is completed. The total estimated cost of this work is estimated to be $1,000,000.

b. Other related funding requirements

The estimated useful life of this project is 20 years.

1. Facility operating costs

The projected facility operating costs for the proposed construction is $2,800,000 per year. This includes maintenance, labor, materials and supplies, plus janitorial and utility services.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars)

1. Title and location of project: Air and water pollution control facilities, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 85-D-121

3. Date A-E work initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 4th Qtr. FY 1985

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: $29,000
Date: 1/85

6. Current cost estimate: $29,000
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$ 5,000	$ 5,000	$ 5,000	$ 531
1986	14,000	14,000	14,000	10,500
1986 Sequestered	(0)	(840)	(840)	(0)
1987	10,000	10,000	10,000	11,600
1988	0	840	840	6,369

8. Brief physical description of project

This project will provide facilities required for the reduction of mercury in Y-12 Plant liquid effluents and for the modification of existing facilities to control particulate emissions. This project consists of two subprojects. One will isolate building sites from which mercury contamination issues and will provide facilities for treatment of all effluents and rainfall runoff from those sites. The second subproject will modify existing enriched and depleted uranium process exhaust systems to reduce the discharge of hazardous particulates to the environment.

Reduction of Mercury in Y-12 Liquid Effluents

Parts of the Y-12 Plant are moderately contaminated with mercury as a result of past large-scale operation of a mercury-based isotope separation system. Rain water and any process water coming into contact with the contaminated buildings, equipment, or soil surrounding the old mercury process facilities generally becomes contaminated with environmentally unacceptable levels of mercury. This project will provide for installation of water treatment facilities for reducing the mercury concentration in water being discharged from the Y-12 Plant to the East Fork Poplar Creek. Construction will include isolation of mercury-contaminated building sites to control all discharges from the site.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Air and water pollution control facilities,
Y-12 Plant, Oak Ridge, Tennessee
2. Project No.: 85-D-121

8. Brief physical description of project (contd.)

Mercury contaminated water originating in the process building will be piped to new or existing collection sumps. New 3,000-gallon holding tanks, transfer pumps, and the necessary piping will be installed to form a surge control holding system. Ion exchange treatment facilities will be built to remove selectively mercury from the contaminated water. Within the mercury contaminated buildings, piping modifications will be made to collect uncontaminated cooling water from compressors, vacuum pumps, and heating ventilation and air conditioning units. New drain lines will be installed to discharge the uncontaminated water into appropriate storm sewer lines.

To isolate the contaminated buildings and surrounding areas from the storm drainage system will involve replacement, rerouting, and restoring components of the existing storm drainage system. Existing main storm sewer lines discharging to East Fork Poplar Creek pass through the mercury contaminated area. Sections of these main storm sewers are contaminated with mercury and, due to deterioration of the reinforced concrete pipe and joints associated with age, contaminated subsurface water enters the system and contributes mercury pollution to the creek. Sections of the storm sewer main lines will be replaced to eliminate infiltration of contaminated subsurface water. Existing mains in the mercury contaminated areas to be abandoned in place include sections of 36-inch, 48-inch, and 60-inch reinforced concrete pipe. The abandoned sections will be filled with concrete grout and/or other suitable material. Existing lateral storm sewer lines will be disconnected from the existing sewer mains and connected to the new mains. Lateral sewer lines to remain in service will be restored by installing an impermeable, corrosion resistant lining inside the existing lines. The lining process will be applied to lateral sewer lines 24 inches in diameter and smaller. All mercury contaminated material excavated during installation and removal of piping systems will be fixed in concrete and disposed of in an approved landfill.

Other remedial construction will include installing new asphalt concrete pavement and repairing and sealing existing paved areas to provide a relatively impermeable surface over mercury contaminated soils. This will decrease infiltration of surface water to the contaminated subsurface zone.

Reduction of Uranium in Process Stack Emissions

The stack emissions control project will refurbish and upgrade the environmental control systems for uranium process exhaust that are currently contributing a significant dose burden to individuals living at the plant boundary. Existing equipment deficiencies will be corrected and new equipment installed on certain exhausts that are not currently treated.

In one major process building, two new fume scrubbers will be installed to process offgas from beaker leaching operations. Each system will consist of a venturi scrubber, 150-gallon tank, recirculation pumps, filter, and circulant cooler. The offgas from the scrubber will be passed through a demister and steam heater prior to an High Energy Particle Air (HEPA) filter and discharged to the atmosphere. The exhaust from an existing extraction vent caustic scrubber will be heated and equipped

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Air and water pollution control facilities, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: [illegible]

8. Brief physical description of project (contd.)

with a HEPA filter. Unfiltered exhaust systems will be equipped with a HEPA filter. A number of exhaust systems will be combined and routed to a central exhaust stack.

Modifications and additions will be made on a second major process building exhaust system. An existing exhaust system will be rebuilt to include a bag house and HEPA filter bank. Part of the system will be relocated and existing exhaust stacks at two building wings will be converted to new exhaust systems. Construction will include an enclosure for the baghouse and HEPA filters, a central exhaust stack, and exhaust fans.

Four new high capacity annular scrubbers will be installed to process the exhaust from wet chemical operations. The scrubbers will remove nitric acid fumes and entrained nitric acid solution from each exhaust to permit the use of HEPA filters on the exhaust. Part of the building roof will be structurally upgraded to support the scrubber systems and to accommodate installation of new exhaust fans, HEPA filters, and a central exhaust stack. The exhaust from the existing [illegible] systems will be rerouted through separate duct work to the new stack.

The exhaust systems from special processing operations will be rerouted to a new central prefilter and HEPA filter bank. New exhaust fans and a central exhaust stack will be provided. A fume scrubber will be provided for the exhaust from the [illegible] recovery acid pickling process. The system will consist of a venturi scrubber, [illegible] tank, recirculation pumps, filters, and a [illegible] cooler. The exhaust from the scrubber will be heated and routed to a HEPA filter. A small building addition will be built to house the special environmental control systems.

Other existing unfiltered process exhaust systems will be rebuilt and otherwise modified so that higher removal efficiencies can be achieved.

Support facilities to be provided include a new [illegible] switch [illegible] with substation to supply power to the exhaust fans and pumps. New motor control centers, power feeders, and distribution panels will be installed. A [illegible] waste solution tank will be installed to store spent scrub solution. The tank will be contained in a [illegible] concrete retainment structure. [illegible], transfer, and sump pumps will be provided. [illegible] facilities will be provided to hold used uranium-contaminated HEPA filters. Instruments will be installed to [illegible] exhaust stacks to measure radioactive discharges to the atmosphere. To [illegible] data needed to calculate dose [illegible], two [illegible] meteorological towers will be installed and equipped to measure wind speed and direction, temperature, and dew point.

The requested FY 1987 funding will be used for procurement of equipment, [illegible] and replacement of storm sewers, [illegible] to prevent seepage of contaminated ground water, and for completion of procurement and construction of [illegible] control facilities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Air and water pollution control facilities, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: [illegible]

3. Purpose, justification of need for, and scope of project

The Y-12 Plant has been cited recently for noncompliance in several environmental areas by both the State of Tennessee Department of Health and Environment (TDHE) and the U.S. Environmental Protection Agency (EPA).

Past and present disposal practices for liquid wastes are no longer acceptable. Dilute liquid wastes may no longer be discharged directly or indirectly to either the East Fork Poplar Creek, which originates within the plant and runs through the City of Oak Ridge, or to the Bear Creek drainage basin.

Certain past operations have left an environmental legacy of mercury contamination at the plant. Lithium isotope separation processes operated in the late 1950's and early 1960's resulted in extensive losses of mercury within the Y-12 Plant. Residual mercury contained in old process buildings and grounds of the plant resulted in the discharge of this hazardous material to the East Fork Poplar Creek and continuous violation of the Tennessee Stream Guide for mercury. In order to attempt to meet the State's [illegible], sources of contamination such as old process buildings, equipment, and soils containing spill residue will be substantially reduced. This project will include drainage from old process buildings containing mercury contaminated equipment in order to control release of mercury contamination. Removal of the mercury contaminated building and equipment is being planned for a future construction project which, when submitted, will include consideration of EPA and TDHE guidance.

Subsequent to the notification of noncompliance in these areas, certain environmental objectives were agreed upon by the TDHE, EPA, and the U.S. Department of Energy (DOE) in a Memorandum of Understanding (MOU) dated May 26, 1983. The MOU delineates the actions which constitute preliminary measures toward full environmental compliance, and it has been strongly stated both in the MOU and subsequent meetings among the TDHE, EPA, and DOE that further plans, actions, and remedial programs will be developed. To this end, this project will provide improvements which are necessary to support the current MOU and those that will be required in the near term to meet further compliance agreements between the parties.

Failure to meet these objectives could result in legal action by the State and/or EPA aimed at shutting down certain operations critical to the manufacture of nuclear weapons components at the Y-12 Plant. These weapons production facilities are not duplicated in the nuclear weapons complex. Under current production workload commitments, a shutdown could deal a serious blow to the national defense effort.

Reduction of Mercury in Y-12 Liquid Effluents

The purpose of this subproject is to isolate primary mercury-contamination areas and to provide source treatment systems to comply with the [illegible]. The effluents from [illegible] discharge mercury contamination removal facilities will be released at a permitted National Pollutant Discharge Elimination System (NPDES) discharge point.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Air and water pollution control facilities, Y-12 Plant, Oak Ridge, Tennessee	2. Project No.: 85-D-121

9. Purpose, justification of need for, and scope of project (contd.)

Interactions between the TDHE, EPA, and DOE have identified a need for specific measures to be taken immediately to cease or treat adequately current discharges of mercury contamination into the East Fork Poplar Creek. The sources of unacceptable discharges to the creek are plant waste waters and mercury-contaminated surface drainage originating from identified sites within the Y-12 Plant. Residual mercury in and around buildings formerly used in lithium isotope separation processes provides a continuous source of mercury contamination. In periods of heavy rainfall, the situation is worsened as additional mercury is flushed from sediments lying in storm drain piping.

This project will provide for a significant reduction (estimated at 90 percent) in mercury emissions which is necessary to meet Clean Water Act requirements. However, even with such a reduction in mercury discharge, it is not very certain that the Tennessee stream limit of 0.05 parts-per-billion can be achieved. The proposed effort to achieve compliance will eliminate a substantial amount of mercury pollution and is expected to achieve substantial conformance with the Tennessee requirements. Failure to make a practical attempt at compliance could result in legal action by the State and/or EPA aimed at shutting down certain operations critical to the manufacture of nuclear weapons components at the Y-12 Plant.

Reduction of Uranium in Process Stack Emissions

As a consequence of the operation of various Y-12 Plant facilities, uranium is discharged into the atmosphere in the form of particulates. To limit the amount of uranium emitted, control devices such as scrubbers and HEPA filters have been installed in many process exhaust systems. In FY 1981, the emission control facilities kept the amount of radioactive uranium particulate emissions well below the existing standards. Under the authority of Sections 112 and 122 of the Clean Air Act, the EPA has declared naturally occurring and man-made radioisotopes as hazardous pollutants, and new regulations have effectively reduced the amount of airborne radionuclides that can be released at the Y-12 Plant. The purpose of this subproject is to provide environmental controls to bring the Y-12 Plant into compliance with the requirements and intent of the new standards.

The basic concept employed to achieve this goal will be to install state-of-the-art emission controls on uranium process exhausts that are currently contributing a significant dose burden to individuals living at the plant boundary and to make provisions for their integrity and functionality. Existing equipment deficiencies will be corrected and new equipment added for certain exhausts which are not currently treated. New onsite meteorological data collection capabilities will be installed for satisfactory modeling of radionuclide dispersion to offsite areas. Sampling systems will also be provided to evaluate and demonstrate compliance.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Air and water pollution control facilities, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 85-D-121

9. Purpose, justification of need for, and scope of project (contd.)

The scope of the work consists of providing environmental controls for enriched uranium production facilities and necessary support systems such as power distribution networks, waste collection facilities, sampling systems, and weather data collection facilities.

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 24 percent of construction costs, Item b...		$ 4,800
b. Construction costs		18,900
(1) Improvements to land including paving, drainage, and storm sewers	$ 7,700	
(2) Building modifications	400	
(3) Special facilities, including air sampling, water treatment, waste disposal facilities, piping, exhaust systems, scrubbers, and filters	9,800	
(4) Utilities, including electrical power distribution	1,000	
Subtotal		23,700
c. Contingency at approximately 22 percent of above costs		5,300
Total estimated cost........		$29,000

11. Method of performance

To the extent feasible, design will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

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a/ This estimate is based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Air and water pollution control facilites, Y-12 Plant, Oak Ridge, Tennessee | 2. Project No.: 85-D-121

12. Funding schedule of project funding and other related funding requiremets

	FY 185	FY 1987	FY 1988	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$11,31	$11,600	$ 6,369	$29,000
Total facility cost	11,31	11,600	6,369	29,000
2. Other project funding				
(a) Conceptual design costs	66	0	0	66
Total other project funding	66	0	0	66
Total project funding (items 1 and 2)	$11,97	$11,600	$ 6,369	$29,066

b. Other related funding requirements (estimated life of project: 15 ears)

1. Facility operating costs	$ 550
2. Programmatic operating expenses directly related to the facilit	1,280
Total other related annual funding requirements	$ 1,830

13. Narrative explanation of total project funding and related funding requrements

a. Total project funding

1. Other project funding

(a) Conceptual design

Conceptual designs for this project have been prepared by he operating contractor at a cost of about $66,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Air and water pollution control facilities, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 85-D-121

13. Narrative explanation of total project funding and related funding requirements (contd.)

b. Other related funding requirements

It is estimated that the useful life of this project will be approximately 15 years.

1. Facility operating costs

Facility operating costs estimated at $550,000 per year include the cost of utilities, janitorial services, related material and supplies, plus overhead.

2. Programmatic operating costs

Facility operating expenses of approximately $1,280,000 annually will cover the cost of operating labor, equipment maintenance, supplies, fuel, and overhead.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Safeguards and site security upgrade, Phase I, Pantex Plant, Amarillo, Texas
2. Project No.: 85-D-123

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3. Date A-E work initiated: 1st Qtr. FY 1985
3a. Date physical construction starts: 4th Qtr. FY 1985
4. Date construction ends: 3rd Qtr. FY 1988
5. Previous cost estimate: $5,000
Date: 1/85
6. Current cost estimate: $5,000
Date: 1/86

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7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$ 1,000	$ 1,000	$ 1,000	$ 74
1986	4,000	3,000	3,000	2,626
1986 Sequestered	(0)	(100)	(100)	(0)
1987	0	1,000	1,000	1,800
1988	0	100	100	500

8. Brief physical description of project

This project provides for a new internal exclusion area and personnel control program to enhance the security posture of the Pantex Plant.

Personnel control facilities include a new internal exclusion area and personnel control facilities for special nuclear materials (SNM) work areas of Zone 12 will be created by the construction of approximately 1.05 miles of 8-foot-high chain link fence and four badge verification stations to control personnel access. Badge verification will be accomplished in guard stations by the addition of electronic badge reader(s), a microcomputer, television monitors, and video disc reader. The badge readers will access a microcomputer located in the administration building.

Each badge verification station (approximately 150 square feet) will be built of concrete masonry with steel joints and metal deck roofs. Each will be strategically located as appendages to existing ramps leading to SNM areas. Each station will have two radiation detectors and traffic control devices such as pipe rails to channel pedestrian traffic and bicycles and gates to control forklift and electric cart traffic. Traffic control devices will be constructed within the existing ramp.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: [illegible] | 2. Project No.: [illegible]

3. Brief physical description of project (scope)

[illegible]

[illegible]

[illegible]

4. Purpose, justification of need for, and scope of project

[illegible]

[illegible]

[illegible]

[illegible]

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrade, Phase I, Pantex Plant, Amarillo, Texas

2. Project No.: 85-D-123

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 25 percent of construction costs, Item b ..		$ 800
b. Construction costs		3,400
(1) Improvements to land	$ 300	
(2) Buildings	400	
(3) Other structures	100	
(4) Special facilities	2,600	
c. Standard equipment		300
Subtotal		$ 4,500
d. Contingency at approximately 11 percent of above costs		500
Total estimated cost		$ 5,000

11. Method of performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$ 2,700	$ 1,800	$ 320	$ 5,000
Total facility cost	2,700	1,800	320	5,000
2. Other project funding				
(a) Conceptual design cost	10	0	0	10
Total other project funding	10	0	0	10
Total project funding (Items 1 and 2)	$ 2,710	$ 1,800	$ 320	$ 5,010
b. Other related funding requirements (estimated life of project: 25 years)				$ 0

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrade, Phase I, Pantex Plant, Amarillo, Texas

2. Project No.: 85-D-123

13. Narrative explanation of total project funding and related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design costs

The cost of the conceptual design prepared for this project was $10,000.

Department of Energy
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CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Tactical bomb production facilities, various locations

2. Project No.: 85-D-125

3. Date A-E work initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 4th Qtr. FY 1985

4. Date Construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: $35,800
Date: 1/85

6. Current cost estimate: $35,800
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$10,000	$ 5,000	$ 5,000	$ 1,467
1986	6,000	9,000	9,000	4,600
1987	12,800	14,800	14,800	12,200
1988	7,000	7,000	7,000	10,400
1989	0	0	0	7,133

8. Brief physical description of project

This project provides for the additional production capacity and new capability required to support the production of additional B61 tactical gravity bombs with safety and security enhancements as projected in the current Nuclear Weapons Stockpile Memorandum. This project funding will provide: new equipment; new buildings and building additions; renovation of some existing structures to adapt them for use in B61 production activities; and special facilities needed for production, certification, and assembly of components. Special facilities will be provided to meet increased production schedules and to implement new technology in safety and security enhancements.

At the Bendix Plant, this project will provide expanded and upgraded facilities in existing space. Approximately 16,000 square feet of existing building space will be modified by installation or relocation of walls; new ceilings and floors; provision of additional temperature, humidity, and dust controls; and extensions of normal factory utilities. Equipment items to be provided include cleaning and conformal coating equipment; tanks, ovens, and process controls; and miscellaneous certification, production, and acceptance equipment. A 5,300-square-foot addition to the main building will be built to accommodate B61 production facilities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Tactical bomb production facilities, various locations	2. Project No.: 85-D-125

8. Brief physical description of project (contd.)

At the Mound Plant, this project will provide equipment for forming and molding plastics, ultrasonic inspection, and miscellaneous certification, production, and acceptance processes. This project will provide a new process line including high vacuum furnaces, new glovebox lines with controlled atmospheres, welders, cleaning and inspection equipment, and specialized gas handling equipment. An existing tritium effluent recovery system will be expanded to control tritium contaminated process gas effluents. No new buildings or building additions are required.

The Y-12 Plant requirements are primarily to support production of the canned subassembly or nuclear secondary. The funding will provide 17,000 square feet of additional production support office space. The addition will be of standard construction to conform to existing criteria. Utilities will be extensions of existing lines. Equipment to be procured includes numerically controlled machine tools and gages; metal preparation and forming furnaces, ovens, and presses; acceptance/inspection equipment; and laboratory support equipment.

At the Rocky Flats Plant, additional equipment will be provided to support technical changes planned for future B61 production. This project will provide the equipment needed for machining and testing. The equipment will include vacuum systems, furnaces, and miscellaneous machine tools. No new buildings or building additions are required.

The requested FY 1987 funding will be used for procurement of equipment, special facilities, and for construction.

Purpose, justification of need for, and scope of project

The purpose of this project is to provide additional production capacity and new capability to improve safety and security features and to increase the B61 tactical bomb production rate. Maximum use will be made of existing capabilities and capacities in the production of these additional B61 bombs, including the facilities provided under Project 82-D-108, Nuclear Weapons Stockpile Improvements, Various Locations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Tactical bomb production facilities, various locations — 2. Project No.: 85-D-125

10. Details of cost estimate a/

a.	Engineering, design, and inspection at approximately 21 percent of construction costs, item b	$ 5,000
b.	Construction costs and special facilities	22,700
c.	Standard equipment, including procurement and installation	1,900
d.	Process uncertainties	700
	Subtotal	$30,300
e.	Contingency at 18 percent of above costs	5,500
	Total estimated cost	$35,800

Estimates by location are as follows:

Rocky Flats Plant, Golden Colorado	$ 300
Bendix Plant, Kansas City, Missouri	11,500
Y-12 Plant, Oak Ridge, Tennessee	13,000
Mound Plant, Miamisburg, Ohio	11,000
Total	$35,800

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

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a/ Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Tactical bomb production facilities, various locations	2. Project No.: 85-D-125

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 6,067	$12,200	$10,400	$ 7,133	$35,800
Total facility cost	6,067	12,200	10,400	7,133	35,800
2. Other project funding					
(a) Conceptual design costs	150	0	0	0	150
Total other project funding..............	150	0	0	0	150
Total project funding (items 1 and 2) ...	$ 6,217	$12,200	$10,400	$ 7,133	$35,950

b. Total related funding requirements (estimated life of project: 20 years)	
1. Facility operating costs	$ 3,000
2. Programmatic operating expenses directly related to the facility	7,500
Total other related funding requirements	$10,500

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design costs

Conceptual design costs of approximately $150,000 will be incurred in the process of developing and improving the project cost estimate and schedule.

b. Total related funding requirements

It is estimated that the programmatic life of these facilities will be at least 20 years.

1. Facility operating costs

Approximately $3,000,000 per year will be required to cover the cost of utilities, maintenance, janitorial services, and related overhead costs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Tactical bomb production facilities, various locations   2. Project No.: 85-D-125

13. Narrative explanation of total project funding and related funding requirements (contd.)

2. Programmatic operating expenses directly related to the facility

The average annual incremental cost of direct labor, tooling procurement, tooling fabrication, and overhead is estimated at $7,500,000 per year.

Department of Energy
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CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: TRIDENT II warhead production facilities, various locations
2. Project No.: 84-D-112
3. Date A-E work initiated: 1st Qtr. FY 1984
3a. Date physical construction starts: 1st Qtr. FY 1985
4. Date construction ends: 4th Qtr. FY 1988
5. Previous cost estimate: $158,500
Date: 1/85
6. Current cost estimate: $158,500
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$19,300	$19,300	$17,914	$ 3,414
1985	60,700	60,700	62,086	21,586
1986	60,700	60,700	60,700	65,500
1987	14,500	14,500	14,500	47,700
1988	3,300	3,300	3,300	20,300

8. Brief physical description of project

This project provides additional production capacity and capability required to support production of the TRIDENT II warhead (W88). Facility requirements for production of the new warhead are described below. In summary, the new facilities to be provided by this project include equipment; building additions; renovation of some existing structures to adapt them for use in TRIDENT II production activities; and special facilities for production, certification, and assembly of components.

At the Y-12 Plant, this project will provide specific new capability for production of new weapon components, including etching facilities, low-voltage imaging system, and a cleaning and packaging facility for metal strips. Additional capacity requirements for production of TRIDENT II warhead parts include a skull caster, abrasive saw, vacuum furnace, precision turning machines, multiaxis mills, a band mill saw, coordinate measuring machines, an ultrasonic gauge, and dye penetrant systems. Existing facilities that will be modified for use in producing the TRIDENT II warhead include preheat ovens, plasma-spray machines, electroplating stations, dryers, crimp welders, life certification and other ovens, a fogbank dryer, a leak test station, a welding system, an adhesive mixing station, and a 2,700-square-foot tool and fixture storage area. A 50,000-square-foot building will be built to provide office space and approximately 8,800 square feet of existing buildings will be built for inspection equipment and for storage. Computer equipment to be provided includes the upgrade of machine controllers to permit interfacing with other production sites.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: TRIDENT II warhead production facilities, various locations

2. Project No.: 84-D-112

8. Brief physical description of project (contd.)

At the Savannah River Plant, the existing tritium facilities will be modified to provide necessary capability and capacity needed for loading TRIDENT II reservoirs. An existing loading room will be modified to accommodate new loading hoods and required manifolds, pinch welders with associated instrumentation, an air-monitoring system, and an emergency confinement system. The project will also include installation of ion chamber detectors in exhaust duct risers, manifold relief piping, and an exhaust hood diversion system.

The Rocky Flats Plant will require minor renovations to existing buildings and provision of production equipment to handle the workload associated with the TRIDENT II warhead. A bottom pour induction casting furnace and three special coordinate measuring machines will be purchased to support pit fabrication and reservoir work. Additional equipment, including welders, microscopes, x-ray fixtures, x-ray spectrometer, gas chromatograph, and ultrasonic scanning equipment will be required. This project will provide for modification of existing safe-secure railcars which is necessary for shipping the TRIDENT II warhead. The safe-secure vehicles will be modified at the Rocky Flats Plant. Two escort rail coaches will be modified for use in safeguarding rail shipments. This project will also provide modifications to existing highway transportation equipment if rail shipment of the warhead assembly is curtailed.

Construction at the Bendix Plant will include a 2,600-square-foot expansion in the Miniature Radar Assembly Facility. This will involve construction of walls; modifications to the existing heating, ventilating, and air-conditioning system; and provision of environmental controls to control relative humidity and temperature conditions. Equipment to be installed in the radar assembly area includes a spectrum analyzer, radiofrequency signal generators, oscilloscopes, pulse generators, frequency counters, and related miscellaneous equipment. Rearrangement of the Electrical and Special Firing System Assembly Facility will include adding 7,600 square feet of floorspace for testing and encapsulation equipment. The space will be acquired from an adjacent manufacturing area. Similar environmental controls will be provided for the space addition. This additional capacity is required to accommodate testing equipment and polyurethane foam encapsulation equipment. This upgrade will include a new air-conditioning system, a grounded conducting floor, mini welder, foam production equipment, and miscellaneous development and assembly equipment. A new 2,200-square-foot microcircuit assembly area will be built for manufacturing and testing the TRIDENT II warhead radar. This area will be a Class 100,000 clean room with 30 percent maximum relative humidity controls and will be equipped with the necessary manufacturing, testing, and support equipment.

The existing Bendix Plant printed wiring board manufacturing and inspection facility will be relocated and expanded. The new 24,000-square-foot facility will include a grated area for plating and etching operations. Construction will include new walls, ceilings, lights, sprinklers, exhaust systems, acid and caustic waste lines, sanitary sewers, and dedicated environmental controls. Equipment to be installed in the new printed wiring board facility will include automatic solution controllers, machining equipment, inspection equipment, and a new photolithography system. The existing printed wiring board manufacturing capacity and inspection facility lacks the capacity needed to accommodate TRIDENT II radar requirements. The planned relocation and expansion are required to provide space for additional production and inspection equipment. In

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: TRIDENT II warhead production facilities, various locations

2. Project No.: 84-D-112

8. Brief physical description of project (contd.)

addition, the existing photolithography system in current use will be replaced with a new system to eliminate further use of chlorinated hydrocarbon solvents and associated environmental pollution control requirements. Existing facilities located on the mezzanine level of the main manufacturing building must be relocated to eliminate potential structural damage to the building.

This project will provide additional support equipment at the Bendix Plant for use in producing TRIDENT II warhead components. Major equipment items include an attenuation measurement system, power measurement system, and a voltage standing wave ratio measurement system for the calibration of the arming, firing, and fusing electronic assemblies. An engineering diagnostic system is also required for development testing and failure analysis of the arming, firing, and fusing assemblies. A new automatic wire bonder and hermetic sealer are required in producing hybrid microcircuits for the TRIDENT II.

Requirements at the Mound Plant for production of TRIDENT II warhead components include 120 pieces of equipment, renovation of existing production space in eight locations, and construction of three support buildings and a new detonator production building. Improved capabilities and capacity will be provided in the following areas. Modifications will be made to existing detonator production facilities to provide a suitable clean room environment and to accommodate equipment for automated parts manufacture. A new 25,000-square-foot parts manufacturing building will be built to accommodate new machine tools needed to produce TRIDENT II timer parts. A five-story central operational support building of approximately 50,000 square feet will be built into a hillside. This structure will provide test and process assembly areas and offices, physical standards laboratories and offices, and offices for process engineering, materials development, and isotopes separation personnel. An addition of approximately 80,000 square feet will be built on the existing four-story Administration Building to provide office space, a conference room, and a classified document distribution center. In the same building, 10,000 square feet of existing space will be renovated to provide suitable space for new office employees to work while awaiting clearance, to provide space for communications equipment, and to accommodate an emergency response communications center. A new two-story process support building of approximately 11,000 square feet will be built in the special metallurgy area to provide offices, a conference room, lobby, storage, shops, and offices for approximately 60 people. Surface analytical instrument and electron microprobe will be installed for use with high explosives to determine materials compatibility, integrity, and quality assurance. Increased cleanliness requirements in the timer manufacturing area will include installation of a new press, a new laser welder, a new dry atmosphere enclosure, a moisture monitor, and a pressurization system.

New manufacturing technology will include high explosive material characterization and detonator testing equipment. An existing coating development (beam tape) facility will be modified and existing equipment will be relocated to accommodate TRIDENT II detonator production and inspection. New equipment will be provided for manufacture of a new variety of detonators. A remotely operated high explosive disassembly lathe with TV monitoring will be provided along with a high explosive incinerator, a laser welder, a 100,000 psi pressurization system, a glue bonding digital readout and data processor, and miscellaneous monitoring equipment. Other major items of equipment to be procured and installed at the Mound Plant include a computer controlled machining center, a surface grinder, a laser measurement system, and an electrical discharge

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: TRIDENT II warhead production facilities, various locations

2. Project No.: 84-D-112

8. Brief physical description of project (contd.)

machining center. A new reservoir component evaluation system will be installed in an existing glove box and will include modifications to the gas expansion system, pressure-volume-temperature (PVT) analytical equipment, a drill system and related alignment, and positioning equipment needed to accommodate the TRIDENT II reservoir.

At the Pinellas Plant, this project will provide production and test equipment to meet TRIDENT II mission assignments of the plant. The following equipment will be installed in existing manufacturing space or in the 30,000 square-foot new building additions to be provided under this project. New equipment will include a vacuum furnace, silk screen printer, sintering furnace, a numerically controlled spinning lathe, real time x-ray inspection system, calibration and testing equipment, and automated assembly facilities.

The Pantex Plant will be provided with standard equipment needed for production support for the TRIDENT II warhead. An accelerated aging test unit will be built which will include a temperature chamber with sampling and recording equipment. Pressure and humidity measurement devices and temperature programmers will be installed to support materials compatibility testing.

The TEC provides $4,500,000 to cover facility design and production/process uncertainties that have not been resolved at this time. Included in this amount are potential costs for a Reaction Injection Molding Machine, thickness gages, quality evaluation equipment, and a facility upgrading for the production of beryllide powder.

The requested FY 1987 funding will be used to complete construction, continue equipment procurement and installation, and finish the safe-secure railcars modification.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide new capabilities and additional production capacity to meet currently established requirements for the TRIDENT II warhead.

Maximum use will be made of existing capacities and capabilities in preparing for production of the TRIDENT II warhead. Unique features of this warhead will require capabilities not currently available in the production plants. The facilities to be provided by this project are required to produce the warhead as scheduled in the current Nuclear Weapons Stockpile Memorandum. The Department of Energy (DOE) and the Department of Defense (DOD) have entered into an agreement to proceed with Phase 3 development engineering for the TRIDENT II warhead. The first production unit is scheduled for October 1988.

A serious deficiency in office space presently exists at the Y-12 Plant as a result of personnel increases associated with weapon production increases over the past several years. Some employees are sharing desks. Some supervisors are sharing

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: TRIDENT II warhead production facilities, various locations
2. Project No.: 84-D-112

9. Purpose, justification of need for, and scope of project (contd.)

offices with their employees. Office spaces have been lost in the past to expansion of production and computer facilities. Subsequent replacements by temporary trailers and building modifications have not kept pace with the office space requirements. The existing office space provides a crowded, poor quality environment for professionals who directly support production activities. The office space shortfall at the end of 1986 is projected at approximately 95,000 square feet. The office building to be provided by this project will provide approximately 27,000 square feet of usable office space and will accommodate 225 people. Approximately 265 personnel requiring office space will be assigned to TRIDENT II production.

10. Details of cost estimate a/

	Total cost
a. Engineering, design, and inspection at approximately 12 percent of construction, standard equipment, and process uncertainties	$ 15,500
b. Construction costs and special facilities	57,000
c. Standard equipment, including procurement and installation	61,150
d. Modification of safe-secure rail cars	4,150
Subtotal	137,800
e. Contingency at approximately 12 percent of above costs	16,200
f. Design and process uncertainties	4,500
Total estimated cost	$158,500

Estimates by location are as follows:

Y-12 Plant, Oak Ridge, Tennessee	$ 44,500
Rocky Flats Plant, Golden, Colorado	20,000
Bendix Plant, Kansas City, Missouri	26,150
Mound Plant, Miamisburg, Ohio	40,700
Pinellas Plant, St. Petersburg, Florida	16,000
Savannah River Plant, Aiken, South Carolina	2,000
Pantex Plant, Amarillo, Texas	5,000
lbuquerque Operations Office, Albuquerque, New Mexico (safe-secure rail cars)	4,150
Total	$158,500

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a/ Estimate based on preliminary warhead design information and completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: TRIDENT II warhead production facilities, various locations

2. Project No.: 84-D-112

11. Method of performance

Design and inspection will be performed primarily by the operating contractors and, where feasible, under negotiated architect-engineer contracts. Equipment procurement, inspection, and installation will be performed by operating contractors.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$ 90,500	$ 47,700	$ 20,300	$158,500
Total facility costs	90,500	47,700	20,300	158,500
2. Other project funding				
(a) Conceptual design costs	770	0	0	770
Total other project funding	770	0	0	770
Total project funding (items 1 and 2)	$ 91,270	$ 47,700	$ 20,300	$159,270

	Total
b. Other related funding requirements (estimated life of project: 10 years)	
1. Facility operating costs	$ 10,780
2. Programmatic operating expenses directly related to the facility	21,000
Total other related funding requirements	$ 31,780

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design

Conceptual design costs of $770,000 have been incurred in the process of developing and improving the project cost estimate and schedule.

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be at least 10 years.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: TRIDENT II warhead production facilities, various locations

2. Project No.: 84-D-112

13. Narrative explanation of total project funding and other related funding requirements (contd.)

1. Facility operating costs

   Facility operating costs include utilities, maintenance, janitorial services, and related overhead.

2. Programmatic operating expenses directly related to the facility

   Programmatic operating expenses include direct labor, materials and supplies, procurement and fabrication of tooling, and overhead.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Antisubmarine warfare/standoff weapon warhead production facilities, various locations
2. Project No.: 84-D-113
3. Date A-E work initiated: 2nd Qtr. FY 1986
3a. Date physical construction starts: 2nd Qtr. FY 1987
4. Date construction ends: 4th Qtr. FY 1990
5. Previous cost estimate: $135,500
Date: 1/85
6. Current cost estimate: $125,700
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$10,000	$ 5,000	$ 5,000	$ 4,000
1987	47,000	47,000	47,000	37,000
1988	58,800	63,800	63,800	52,500
1989	8,900	8,900	8,900	25,500
1990	1,000	1,000	1,000	6,700

8. Brief physical description of project

This project provides additional production capacity and capability required by the weapons production complex to produce nuclear warheads for the antisubmarine warfare/standoff weapon (ASW/SOW) program. Capital requirements at the weapons production plants will consist primarily of standard equipment, special facilities, and additions to existing buildings needed to build weapon components. Following are descriptions of new construction to be provided at each site.

At the Bendix Plant, a 1,600-square-foot modular-type environmentally controlled room will be procured and installed inside the main manufacturing building. Environmental controls will maintain the room at 68°+ 0.5°F. Preparation for this installation will include removal of existing walls, ceilings, ductwork, and sprinkler piping. Existing equipment will be relocated. Following installation of the modular facility, modified walls, ventilation, and fire protection systems will be replaced. Additional equipment will be procured and installed at various locations throughout the plant. This standard equipment will include plasma treatment equipment, a high precision coordinate measuring machine, a duplex mill, automated production and inspection equipment, and foam processing equipment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Antisubmarine warfare/standoff weapon warhead production facilities, various locations

2. Project No.: 84-D-113

8. Brief physical description of project (contd.)

At the Pinellas Plant, this project will provide procurement and installation of standard production and test equipment needed for the processing and processing support activities directly associated with the manufacture of ASW/SOW neutron generators and other components included in the Pinellas Plant mission assignment. This project will also provide material transport systems, work station control centers, and automated machine shop equipment such as direct numerically controlled lathes and mills.

At the Pantex Plant, available building space will be modified for special facilities and new equipment needed for ASW/SOW production. An accelerated aging unit and testing system will involve construction of a test chamber and associated sampling and recording equipment. Standard equipment including process equipment, analytical and certification equipment, and process robotics will be provided to support production and final warhead assembly. A 3,600-square-foot automation and remote operations testing facility will be built.

At the Mound Plant, this project will provide for approximately 210 pieces of equipment for analytical support, product testing, standards calibration, manufacturing advanced devices, material testing and evaluation, nuclear safety requirements, component evaluation. Five building modifications or additions of approximately 27,000 square feet will be built for materials compatibility determinations, for thermal testing, for explosives and thermite preparations, and for ion implementation.

At the Rocky Flats Plant, existing production space will be modified to accommodate new production equipment needed for fabrication of ASW/SOW component parts. This project will provide machine tools, process equipment, inspection devices, and laboratory equipment for use in producing the new weapon components. All new equipment will be installed in existing buildings. Forty-seven pieces of equipment have been identified, including a plasma spectrometer, a numerically controlled hole drilling machine, T-base lathes, a foundry furnace, coordinate measuring machines, and large electron beam welders. Major modifications will be made to Building 777. Significant equipment installation costs have been identified.

At the Y-12 Plant, this project will provide new equipment and process systems such as a vacuum heat treating furnace, an automated manufacturing center, a plate thickness gauge, and specialized material test and certification equipment.

The cost estimate for this project has been reduced by $9,800,000 since the FY 1986 budget submittal as a result of improved definition of warhead design and completion of conceptual design of the production facilities. The current cost estimate includes $11,900,000 for design and process uncertainties at three production plants that remain to be resolved. Of this amount, $5,500,000 covers design and process uncertainties at the Bendix Plant to cover an analytical chemistry laboratory if

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Antisubmarine warfare/standoff weapon warhead production facilities, various locations
2. Project No.: 84-D-113

8. Brief physical description of project (contd.)

required to test a component and to cover production capacity unknowns associated with potential schedule variations. At the Rocky Flats Plant, $4,000,000 has been included for uncertainties in design and production facilities planned.

The FY 1987 funding requested will be used for design, procurement of long-lead equipment, and for starting building modifications at Rocky Flats and Mound Plants.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide new capabilities and additional production capacity to meet established warhead requirements for the ASW/SOW.

Maximum use will be made of existing capacities and capabilities in preparing for production of the ASW/SOW warhead. Unique features of the weapon will require capabilities not currently available in the production plants. The additional number of parts added to the production workload will require additional capacity at the production plants. The facilities to be provided by this project are required to produce the ASW/SOW warhead as scheduled in the current Nuclear Weapons Stockpile Memorandum. The Department of Defense and the Department of Energy (DOE) plan to enter into an agreement to proceed with development engineering (Phase 3) in April 1986.

The completion schedule and cost estimate for production of the ASW/SOW warhead rely upon the availability of facilities to be provided by previously authorized weapons systems including facilities funded under Project 81-D-115, Missile X Warhead Production Facilities, and facilities included in Project 84-D-112, TRIDENT II Warhead Production Facilities.

Reliance upon Project 82-D-109, 155mm AFAP Production Facilities, has been terminated and the necessary shared facilities have been included in this project. The FY 1985 estimate for the ASW/SOW project relied upon the availability of facilities and equipment, valued at approximately $9,000,000, to be provided under Project 82-D-109. Subsequently, the latter project has been redeveloped to utilize facilities equipment that will be made available from the production facilities of the 8-inch AFAP (W79). The cost estimate for Project 82-D-109 no longer includes funding for facilities previously planned for joint use with ASW/SOW production.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Antisubmarine warfare/standoff weapon warhead production facilities, various locations

2. Project No.: 84-D-113

9. Purpose, justification of need for, and scope of project (contd.)

The total estimated project cost was reduced by about $10,000,000, primarily due to improved design definition on the ASW/SOW warhead. This enabled the Rocky Flats Plant to reduce significantly funding requirements that were initially estimated to support two design options.

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 16 percent of construction costs, item b		$ 9,700
b. Construction costs		60,400
(1) Building additions and modification of existing buildings	$ 11,730	
(2) Special facilities, including installation of production equipment and processing systems	48,670	
c. Standard equipment		26,200
Subtotal		96,300
d. Contingency at approximately 18 percent of above costs		17,500 b/
e. Design and process uncertainties		11,900
Total estimated cost		$125,700

The estimates by location are as follows:

Bendix Plant, Kansas City, Missouri	$ 8,800
Pinellas Plant, St. Petersburg, Florida	11,020
Pantex Plant, Amarillo, Texas	4,000
Rocky Flats Plant, Golden, Colorado	17,590
Mound Plant, Miamisburg, Ohio	41,450
Y-12 Plant, Oak Ridge, Tennessee	30,940
Uncertainties	11,900
Total	$125,700

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a/ Based on completed conceptual designs.

b/ Contingency applies to work to be performed in FY 1986, FY 1987, FY 1988, FY 1989, and FY 1990.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Antisubmarine warfare/standoff weapon warhead production facilities, various locations

2. Project No.: 84-D-113

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 4,000	$37,000	$52,500	$25,500	$ 6,700	$125,700
Total facility costs	4,000	37,000	52,500	25,500	6,700	125,700
2. Other project funding						
(a) Conceptual design costs	180	0	0	0	0	180
Total other project funding	180	0	0	0	0	180
Total project funding .... (items 1 and 2)	$ 4,180	$37,000	$52,500	$25,500	$ 6,700	$125,880

b. Other related funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ 1,580
2. Programmatic operating expenses directly related to the facility	3,250
Total other related annual funding requirements	$ 4,830

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design costs

Conceptual design costs of approximately $180,000 will be incurred in the process of developing and improving the project cost estimate and schedule.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Antisubmarine warfare/standoff weapon warhead production facilities, various locations

2. Project No.: 84-D 113

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be 20 years.

1. Facility operating costs

Facility operating costs of approximately $1,580,000 per year are projected to cover the costs of utilities, maintenance, janitorial services, and related overhead.

2. Programmatic operating expenses directly related to the facility

Programmatic operating costs of approximately $3,250,000 per year are projected to cover direct labor, fringe benefits, production materials and supplies, and related overhead.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Environmental improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 84-D-124

3. Date A-E work initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 2nd Qtr. FY 1985

4. Date construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: $56,000
Date: 1/85

6. Current cost estimate: $45,400
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 7,600	$ 0	$ 0	$ 0
1985	21,400	17,000	17,000	3,887
1986	0	12,000	12,000	17,000
1986 Sequestered	(0)	(720)	(720)	(0)
1987	10,000	10,000	10,000	14,000
1988	6,400	7,120	7,120	6,000
1989	0	0	0	4,513

8. Brief physical description of project

This project provides for construction of new facilities and modification of existing facilities for the handling and treatment of liquid and solid wastes and for the containment and elimination of major pollution sources and hazards. Twelve subprojects to be completed by this project are categorized in three primary classes of environmental control activities: (1) liquid waste disposal; (2) solid waste disposal; and (3) general environmental control and support.

Facilities for liquid waste disposal improvements will be provided by five subprojects:

1. A waste water treatment facility will provide for treatment of acid and caustic discharges from the Y-12 coal yard and steam plant. It will include facilities such as concrete-lined collection ditches for directing coal yard runoff, a collection basin for flow equalization and settling coal fines, a chemical system for neutralizing the waste water and for precipitating trace metals, a clarifying system, and a sludge dewatering system. About 3,000 square feet of new building space will be built for instrumentation and controls and for various equipment requiring weather protection.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental improvements, Y-12 Plant, Oak Ridge, Tennessee
2. Project No.: 84-D-124

8. Brief physical description of project (contd.)

2. Plating rinse water waste treatment will be accomplished by installation of a facility for processing about 8 million gallons per year of plating rinse water. Chemical and electromechanical treatment process system and filtration and clarification treatment will be provided. Associated collection tanks, pumps, piping, and instrumentation for systems operation are included.

3. National Pollutant Discharge Elimination System requirements of the Environmental Protection Agency (EPA) will be supported by construction of approximately 15 monitoring stations which will include flow measurement equipment, continuous pH and temperature monitors, and flow proportional samplers. A 100-square-foot building will be built at each station to house instrumentation and monitors.

4. Source collection and treatment facilities will be built to collect and treat effluents from the Y-12 Plant production buildings. These facilities will include collection tanks, spill containment, piping, and truck loading stations to handle about 130,000 gallons per year of decontamination waste water, indeterminant quantities of acid pickling waste and rinse water from the uranium foundry, and about 30,000 gallons per year of photographic fixer solution and other waste streams. Contingency provision has been made to collect and treat dilute rinse solutions from photographic film development if required by EPA.

5. A facility will be provided at the west end of the plant for treatment of approximately 2 million gallons annually of nitrate and other contaminant bearing process waste waters. Head end treatment of received wastes, such as pH adjustment, heavy metal precipitation, and biological nutrient addition will be accomplished in seven new 6,000-gallon agitated waste storage tanks and a 15,000 gallon reactor vessel. Adjusted wastes will be transferred to existing 500,000-gallon biodenitrification and bio-oxidation reactors. The biotreated waste waters will be filtered in new activated carbon packed beds prior to chlorination. The chlorinated waste water will be retained for 24 hours in one of three existing effluent equalization basins before discharge through a new National Pollution Discharge Elimination System monitoring station to the East Fork Poplar Creek. Waste sludge will be collected in a sludge holding tank before acceptable disposal. A prefabricated industrial-type steel frame building with about 12,000 square feet of ground floor space and about 3,800 square feet of mezzanine space will be provided to protect against freezing the waste treatment systems in winter and to provide space for storage, maintenance, operating controls, changehouse, and truck unloading.

Solid waste disposal improvements will be provided in two subprojects:

1. Approximately 32,000 cubic feet of reinforced concrete vaults will be built to provide environmentally acceptable storage for uranium oxide.

1. Title and location of project: Environmental improvements, Y-12 Plant, Oak Ridge, Tennessee	2. Project No.: 84-D-124

8. Brief physical description of project (contd.)

2. Construction will be provided to facilitate reduction or elimination of contamination in surface and subsurface waters in the Bear Creek Valley watershed area. Four sub-suprojects supporting required remedial actions are as follows:

2a. Leachate control at waste burial sites. This construction will consist primarily of earthwork for surface-drainage control, site grading, and construction of approximately 23 acres of impervious capping. Individual waste burial sites will be stripped of vegetation. Capping will be provided to prevent leaching of contaminants from buried wastes by precipitation. The capping will consist primarily of a clay layer with an additional impervious fabric membrane and an overlying soil layer. Vegetation will be reestablished for erosion control.

2b. Removal of PCB-contaminated oil retention ponds. PCB-contaminated liquids and solids in oil retention ponds will be removed and stored for future disposal, and leachate collection system will be installed. Surface drainage control will be provided to reduce the intrusion of rain water into the construction area. A storage tank will be provided nearby for retention of the PCB-contaminated pond liquids. Approximately 4000 cubic yards of PCB-contaminated sludge and soils will be excavated and stored in a roofed, concrete vault to be built nearby. The excavation area will be protected from precipitation by an impermeable clay cap. A seepage collection system will be built to intercept and divert the contaminated seepage from the excavated site for collection and processing.

2c. Ground water Treatment Facility. A facility will be built to treat contaminated ground water at the Y-12 Plant. The primary objective of the facility is to enable the Y-12 Plant to remove highly contaminated ground water from specific locations in the watershed and to treat the recovered ground water by removing the contaminants of concern. The facility will be sized and designed to treat groundwater proven to contain very high concentrations of contaminants. Land improvements will include roads, paved parking, fencing, and security lighting. A 4,800 square feet, preengineered building on a concrete slab will be provided to house the water treatment process. An equal amount of covered space will be provided as an attached canopy built on the process building for the protection of truck unloading operations and outside storageand processing tanks. The water treatment process facilities will provide continuous biodenitrification reactors designed for a nominal 3-gallons-per-minute throughput capability of 10 gallons-per-minute for pH adjustment, removal of heavy metals, removal of organics, and clarification of contaminated water.

2d. Support facilities. In support of the removal of PCB-contaminated soils and sludges from the oil retention ponds, a 14,000 square feet concrete storage vault will be constructed. It will be covered by a metal pre-engineered roof structure and will include an internal drainage and collection system. Liquid storage facilities to receive and store contaminated oil and water will include a concrete foundation and diking system for storage tanks, a truck unloading station with spill and leakage containment, one 500,000-gallon storage tank, two 10,000-gallon storage tanks, and the necessary oil separator, pumps, and piping.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental improvements, Y-12 Plant, Oak Ridge, Tennessee
2. Project No.: 84-D-124

8. Brief physical description of project (contd.)

An operations support building will be located in the Bear Creek Burial Grounds. Area preparation will include construction of roads, fencing, and vehicle parking. The building will consist of about 2,900 square feet of gross space and will be equipped for supervisory offices, change rooms, lunch room, and restrooms. Utilities to be provided will include potable water, power, area lighting, and water for fire protection.

General environmental control measures are included in the following five subprojects:

1. Five new 40,000-gallon tanks will be built on a new diked concrete pad for storage of waste oils containing polychlorinated biphenyls (PCB), uranium, or other contaminants. Separation systems for waste oils will be provided.

2. Facilities for transfer and collection of plant chemical wastes including spill containment capability will be provided. A tank facility comprised of four 10,000 gallon tanks diked for spill containment will be provided for waste solution collection prior to transfer to waste treatment facilities. Approximately 10,000 gallons of double contained storage will be provided for collection of flammable liquids scheduled for later incineration.

3. An existing analytical laboratory will be refurbished and expanded to handle a tenfold increase in workload recently imposed by environmental concerns and agreements for corrective actions with the State of Tennessee and the EPA. This subproject will refurbish approximately 10,000 square feet of space in an existing building to support environmental laboratory activities. Some existing laboratory equipment will be relocated to the expanded area and some new equipment will be provided. The additional laboratory capacity will be utilized for water, sample preparation, and analyses in support of waste material processing, transportation and disposal, salvage operations, and personnel monitoring programs.

4. This subproject will provide for replacement of approximately 40 PCB-filled in-service electric transformers located in areas representing high environmental risk from the hazardous PCB. (Additional PCB-filled in-service transformers which will require replacement are included in Project 86-D-123, Environmental Hazards Elimination, various locations.)

5. New building space of about 30,000 square feet will be provided as an environmental operations support base. This support base will provide changehouse facilities for about 100 operating personnel, a field laboratory, office space for approximately 40 environmental staff and maintenance staff personnel, a utilities field office, a light maintenance shop, and storage space for operations and maintenance equipment. Other provisions include terminal facilities for the waste tanker fleet including a diked parking area for loaded tankers waiting analyses of their waste contents, a tanker rinse facility, and a solution transfer station.

Special facilities to be provided under this project consists primarily of special vehicles required for excavation and transportation of waste from cleanup actions. Some of the vehicles will require modifications to protect operators from direct contact with contaminated materials. Most of the vehicles will become contaminated and may be unuseable for other

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 84-D-124

8. Brief physical description of project (contd.)

purposes if decontamination is not feasible. The vehicles include one 300-horsepower bulldozer, three 5-cubic yard frontend loaders, one 5,000-gallon tanker, two 6-cubic yard watertight containers (dumpsters) for sludge hauling, and portable water pumps.

Standard equipment included in this project includes liquid waste tank trailers, office furniture and laboratory equipment.

The cost estimate revision is based on a significantly revised definition of work to be accomplished. The preceding narrative describes the work currently planned and is supported by a completed conceptual design. The total estimated cost of the project has been reduced from $56,000,000 to $45,400,000 primarily through deletion of three subprojects. Following is a summary of changes to the initial project scope:

1. A 500-square-foot building planned for operational support at an existing uranium chip oxidizer facility was built using general plant project funds.

2. The subproject which called for demolition and decommissioning of a mercury-contaminated process facility that has been idle for many years has been deleted from this project. The results of recently completed engineering studies of various dismantling and decontamination options indicate that the cost for completing this project as initially planned would greatly exceed the initial estimate. Further studies are warranted to determine if there are less costly viable alternatives for dismantling and decontaminating the facility or if there are acceptable alternatives to dismantling and decontamination to solve the problems associated with the facility in its existing condition. Upon completion of these studies and selection of a preferred course of action, funding for this subproject will be requested. In the interim, construction planned under Project 85-D-121, Air and Water Pollution Control Facilities, Y-12 Plant, will isolate the site of this mercury-contaminated building to control and collect any mercury contaminated drainage.

3. The subproject previously requested for initial site development of approximately 25 acres for a new central waste disposal facility has been deleted from this project. Responsibility for developing and operating this facility for disposal of low-level radioactive waste from all Oak Ridge Operations Office (ORO) activities including the Y-12 Plant, has been assigned to the Department of Energy (DOE) Defense Waste and Byproducts Management Division, Assistant Secretary for Nuclear Materials. Funding required to plan a facility for disposal of low-level radioactive wastes from Y-12 Plant activities has been requested in the Defense Waste and Byproducts Management budget under Project 86-D-123, Central Waste Disposal Facility.

4. The subproject at the west end of the Y-12 Plant for a facility to treat contaminated waste waters has been changed to include a 15,800-square-foot building to enable year-round operation of the waste treatment systems and provide space for support operations. Minor changes have been made in several other subprojects.

The requested FY 1987 funding will be used for design, procurements, and construction of the subprojects described above.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental improvements, Y-12 Plant, Oak Ridge, Tennessee
2. Project No.: 84-D-124

9. Purpose, justification of need for, and scope of project

The purpose of this project is to attain compliance at several environmental areas by both the State of Tennessee Department of Health and Environment (TDHE) and the EPA. This project is needed to bring several facilities throughout the Y-12 Plant into compliance with a number of environmental laws and regulations. These include the Clean Water Act (CWA), the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), and the Toxic Substances Control Act (TSCA). The CWA's requirements apply to all subprojects of the environmental improvements line item. The CWA requires the application of the National Pollutant Discharge Elimination System (NPDES) permit to the Y-12 Plant site. That permit requires a high degree of treatment to all process-related waste waters originating within the plant. It also requires the application of Best Management Practices to all operations within the plant. This program will cover both sources of pollution emanating from process as well as area sources of pollution resulting from past operations and storage practices. Sections of the regulations resulting from the CWA relate to spill prevention and control at a number of waste and chemical materials storage sites throughout the facility. The objective of such projects is to preclude or mitigate the potential of any toxic or hazardous substances or wastes from reaching the waters of the State of Tennessee.

The waste water treatment and collection facilities to be provided by this project will provide the capability to meet the best available technology requirements for the waste waters generated by the Y-12 Plant. These best available technology standards are very stringent requirements for the elimination of metals and toxic organics from process waste waters.

The proposed construction is necessary under an agreement reached by the DOE, the EPA, and TDHE. This Memorandum of Understanding (MOU) mandates a number of activities, all related to the elimination of process waste waters and point source contamination from reaching the East Fork Poplar Creek. This creek originates within the plant area and flows through the City of Oak Ridge. The same requirements are also set forth in TDHE's Complaint and Order, which sights a number of areas of noncompliance with Tennessee Water Pollution Control Regulations and seeks relief from past practices. Completion of this project provides for compliance with those legal requirements as well as those of the (NPDES) permit. Finally, the design and construction milestone dates for the waste water treatment and collection facilities are required to be met according to the Federal facilities compliance agreement between the EPA and DOE.

RCRA and CERCLA apply to those projects associated with solid waste and with disposal area remedial actions in the Bear Creek burial ground. These actions have also been covered by the MOU, Complaint and Orders, and Orders for Correction mandating compliance with Tennessee Hazardous Waste Management Act and the Tennessee Water Quality Act. The environmental improvements project will enable proper management of solid wastes and hazardous wastes in full compliance with the Federal and state regulations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental Improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 86-D-128

9. Purpose, justification of need for, and scope of project (contd.)

Liquid waste disposal

The current practice of discharging diluted untreated effluents such as acids, caustics, and plating wastes to local streams is in violation of requirements of the Federal Water Pollution Control Act. Liquid waste will be intercepted at the sources and treated by the proposed facilities. These facilities include waste collection tanks, dikes, piping, and package treatment units and monitors for treated effluents to assure compliance with discharge permits.

Solid waste disposal

Construction required to support remedial actions in the Bear Creek Valley watershed area has been refined in this FY 1987 construction project data sheet. A Complaint and Order issued in December 1983 by the Tennessee Department of Health and Environment (TDHE) required DOE to submit a proposal and schedule for remedial action to eliminate contaminants in the Bear Creek Valley. The DOE proposal, submitted on July 1, 1984, called for completion of an extensive investigation of Bear Creek Valley where past DOE waste disposal burials have contaminated local groundwater and surface water (Bear Creek). The proposed investigation was completed by DOE in July 1985. The results were reported to TDHE by DOE Oak Ridge Operations Office together with proposed remedial actions. The facilities included in this construction project will support the initial remedial actions proposed to and required by TDHE for elimination of contaminants in Bear Creek Valley. Remedial actions to be accomplished include: reduction of leachate generation; removal of polychlorinated biphenyl (PCB) contaminated soils and water; and an initial step in decontaminating groundwater. The remedial actions supported by this project are mandatory under existing agreements between DOE Oak Ridge Operations Office, TDHE, and the Environmental Protection Agency (EPA).

The groundwater treatment facilities to be provided are required at the earliest possible date for removal and treatment of groundwater proven to contain very high concentrations of contaminants. These facilities will remedy the "worst-case" groundwater contamination. The treatment facilities provided by this project will not solve all known groundwater problems in the Bear Creek Valley. The total quantity of contaminated groundwater that will require treatment has not been established.

It is noted that this project supports only immediately required remedial actions in the Bear Creek Valley Waste Disposal Area, as agreed to by EPA, TDHE, and DOE. Future remedial work beyond that which is included in this project will be required. Additional requirements will be determined following completion of an Environmental Impact Statement now in progress and scheduled for completion in mid-1987.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental Improvements, Y-12 Plant, Oak Ridge, Tennessee — 2. Project No.: 84-D-124

9. Purpose, justification of need for, and scope of project (contd.)

General environmental control measures

Other environmental hazards that require elimination include replacement of power transformers containing PCBs, separation of contaminated waste oil and solvent and processing for commercial sale or other acceptable disposal, additional storage tank capacity, and additional diking of several storage facilities within the plant to control chemical spills.

Expansion of the Y-12 Plant laboratory is required to handle a significantly increased workload for environmental sampling and to provide a lower radioactive background for environmental sample analyses.

The extensive environmental control facilities provided by this line item project are the result of mandates by Federal and State of Tennessee regulatory agencies. The regulatory requirements apply to a large number of contamination sources distributed widely among many buildings and operations at the Y-12 Plant site. To assure that the requirements will be met, environmental operations support facilities will be provided to consolidate and centralize the functions of environmental control.

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 22 percent of construction costs, item b ..		$ 6,400
b. Construction costs		29,600
(1) Buildings		
(a) Process buildings, approximately 23,800 square feet at about $100 per square foot	2,400	
(b) Process support buildings, approximately 35,000 square feet at about $80 per square foot	2,800	
(2) Building and laboratory modifications, approximately 10,000 square feet at about $175 per square foot	1,300	
(3) Special facilities	18,700	
(4) Utilities, including electrical power, water, steam, and sanitary sewer lines	4,400	
c. Standard equipment including vehicles, laboratory equipment and furniture		100
Subtotal		$36,100
d. Contingency at approximately 26 percent of above costs		9,300
Total project cost		$45,400

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a/ Cost estimated based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 84-D-124

11. Method of performance

To the extent feasible, design will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$20,887	$14,000	$ 6,000	$ 4,513	$45,400
Total facility cost	20,887	14,000	6,000	4,513	45,400
2. Other project funding					
(a) Conceptual design cost	100	0	0	0	100
Total other project funding	100	0	0	0	100
Total project funding (Items 1 and 2)	$20,987	$14,000	$ 6,000	$ 4,513	$45,500

b. Other related funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ 4,250
2. Programmatic operating expenses directly related to the facility	3,400
Total other related annual funding requirements	$7,650

13. Narrative explanation of total project funding and related funding requirements

a. Total project funding

1. Other project funding
   (a) Conceptual design cost
      The cost of preparing a conceptual design for this project will be approximately $100,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental improvements, Y-12 Plant, Oak Ridge, Tennessee		2. Project No.: 84-D-124

13. Narrative explanation of total project funding and related funding requirements (contd.)

b. Total related funding requirements

1. Facility operating costs

The facility operating costs estimated for this project at $4,250,000 per annum include utilities, labor, material, and supplies for maintenance and janitorial services. Of this cost approximately $2,250,000 per annum is projected for operating the groundwater treatment facility.

2. Programmatic operating expenses directly related to the facility

The programmatic operating expenses associated with operating the facilities provided by this project include direct labor, fringe benefits, and overhead costs plus the cost of supplies and materials required in the operation.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Safeguards and site security upgrading, Y-12 Plant, Oak Ridge, Tennessee
2. Project No.: 84-D-211
3. Date A-E work initiated: 1st Qtr. FY 1985
3a. Date physical construction starts: 1st Qtr. FY 1985
4. Date construction ends: 4th Qtr. FY 1989
5. Previous cost estimate: $68,000 Date: 1/85
6. Current cost estimate: $68,000 Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 7,500	$ 0	$ 0	$ 0
1985	8,000	8,000	8,000	4,217
1986	7,500	13,000	13,000	15,983
1986 Sequestered	(0)	(780)	(780)	(0)
1987	28,000	30,000	30,000	27,600
1988	17,000	17,780	17,780	16,900
1989	0	0	0	3,300

8. Brief physical description of project

This project provides for the installation of new facilities and systems and modifications to existing facilities and systems to upgrade the safeguards posture of the Y-12 Plant. The project, as currently defined, includes the following items:

a. Closure and control of Bear Creek Road

Includes barriers with hardened guard portals on the east and west end of Bear Creek Road, identification check booths on Bear Creek Road, and unmanned vehicle barriers on secondary roads.

b. Guard Towers

Includes two hardened, elevated guard towers with two-level firing ports, emergency power, external lighting, and necessary utilities service. One tower would be located on the north side of the plant and one on the south side of

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 84-D-211

8. Brief physical description of project (contd.)

the plant. In addition, smaller guard towers will be constructed consisting of an enclosed base with a hardened guard booth on the top. Four of these towers will be located along the protected area perimeter and four will be located along an adjacent patrol road.

c. Relocation of construction contractor

Covers construction of approximately 37,500 square feet of new floor space to provide for relocation of the onsite construction contractor from the present location to a location west of the plant.

d. Perimeter intrusion detection/assessment system (PIDAS)

Involves the construction of approximately 14,000 feet of new double fencing around the plant protected area, installation of three levels of alarm sensors with closed circuit television (CCTV) assessment capability, and upgrading of lighting. It also provides for demolition/relocation of utilities as required to facilitate construction and replacement of parking space and storage vault space lost due to construction. A new coal conveyor and hopper system will be provided to get coal into the protected area where the steam plant exists. In addition to the plant protected area, Israeli taut wire and improved lighting will be installed along portions of the existing outer plant perimeter fence. Data panels will be provided to collect the taut wire signal inputs and multiples them to both the existing central alarm station on a newly provided secondary alarm station. This system also includes eight additional guard towers, four located along the protected area boundary and four located along the south patrol road. (See Item 8b. above.)

e. Harden personnel monitor stations and material access areas

Existing personnel monitoring stations located at the entrances of the Material Access Areas (MAAs) will be replaced. New hardened stations will provide facilities such as automated credential and personnel identification verification, improved Special Nuclear Material (SNM) detection systems, incoming metals detection, and pass-through radiation detectors. Airlocks will be constructed to connect the existing SNM doors of the MAAs to the loading dock. The airlocks will be equipped with both alarm and assessment devices. An alarmed door will be provided at docks to interface with the SNM transfer vehicle. All SNM transfer vehicles will be modified such that they will become an integral part of the MAA during SNM transfers. Also, an enclosed loading dock and freight elevator will be constructed to provide secure access to the weapons material reclamation area.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 84-D-211

8. Brief physical description of project (contd.)

   f. Upgrade central alarm system

   Covers the procurement and installation of equipment and software modification to upgrade the central alarm system to provide a backup alarm system and video recording capabilities.

   g. Harden protected area portals

   This item covers construction of new hardened pedestrian and vehicular protected area portals including armor, gun ports, exit and entrance barriers, duress devices, and upgraded lighting.

   h. Guard headquarters and emergency management center

   Includes the demolition of an existing building and the relocation of its personnel into appropriate space and the construction of a guard headquarters facility consisting of an upper level with approximately 22,000 square feet to house the Y-12 security inspector force and related operations and a lower level garage area for protective forces patrol vehicles. This facility will contain offices, restrooms, change rooms for men and women, weapons and ammunition storage vault, conference and training areas, parking, exercise facilities, and a hardened enclosure for a central alarm station. The emergency management center, approximately 2,000 square feet, is a building addition to serve as an emergency management center during plant emergencies and will be the center of information and communications to insure adequate control of emergency situations.

The requested FY 1987 funds will be used for Title III engineering, equipment procurement, initiate construction of PIDAS system, personnel monitoring stations, MAA docks, and emergency management center.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide for upgrading of physical protection at the Y-12 Plant as required to meet current U.S. Department of Energy (DOE) threat guidance. Detailed evaluations of the safeguards posture of the Y-12 Plant, which were initiated in February 1982 with the assistance of Sandia National Laboratories and Lawrence Livermore National Laboratory, resulted in the identification of various weaknesses in existing systems. A number of "quick fixes" addressing weaknesses disclosed during these evaluations have been initiated utilizing available general plant project, capital equipment, and expense funds.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: [illegible]

9. Purpose, justification of need for, and scope of project (contd.)

Justification for each item included in the project is presented below.

a. Closure and control of Bear Creek Road

This is an "Official Use Only" road which parallels the north perimeter fence of the plant and runs near a major weapons production building housing a significant quantity of highly enriched uranium. The primary purposes of closure and control of this road are to provide the capability for containing or delaying adversaries attempting to leave the facilities in a land vehicle and to prevent easy access by adversaries to areas which are in close proximity to major production facilities housing a significant quantity of highly enriched uranium.

b. Guard towers

The towers will enhance the capability for early detection, assessment, and warning of approaching adversaries. The towers provide cover and a firing platform overlooking a major path of escape. A security inspector positioned in the tower can contain adversaries until a response team arrives. During an evacuation of a nearby material access area, the security personnel within the tower can observe and initiate containment of exiting personnel.

c. Relocation of construction contractor

The present location of this contractor is operated as an "island" in the plant protected area and is accessible to uncleared workers, vendors, and other visitors. The protected area perimeter will also be straightened and shortened by eliminating this "island."

d. Perimeter intrusion detection/assessment system (PIDAS)

This system is necessary for effective detection of intruders attempting to gain access into the protected area.

e. Hardened personnel monitor stations and material access areas

The need for hardening of personnel monitor stations is to provide protection for the security inspector.

f. Upgrade central alarm station

This item is required to correct a number of current and potential problems with the existing system and its operation and to provide backup capability.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Safeguards and site security upgrading, Y-12 Plant, Oak Ridge, Tennessee	2. Project No.: 88-D-211

6. Purpose, justification of need for, and scope of project (contd.)

a. Harden protected area portals

This item is required to protect the attending security inspector.

b. Guard headquarters and emergency management center

The guard headquarters facility is required to accommodate increases in the Y-12 security inspector force. The existing facility is inadequate for the current force, and this problem will become more critical with projected increases to the force. The Emergency Management Center is required to provide a site/facility where plant management, DOE personnel, and Federal, state, and local law enforcement agencies can manage plant emergencies. No existing facility exists which will handle these people and their activities. The proposed facility will be designed and equipped specifically for effective handling of emergencies.

Under the constraints of DOE security orders, currently there are no acceptable alternatives to this project or an entity or as a whole. Failure to provide the equivalent of this project will impose unwanted security risks.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 84-D-211

10. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 20 percent of construction costs, item b ..		$ 8,200
b. Construction costs		41,760
(1) Improvements to land including grading, landscaping, drainage, paving, and fencing..........	$ 500	
(2) Buildings		
(a) New and modified space to includ. items such as vaults, guard facilities, personnel monitoring station, and other related changes, approximately 25,600 square feet at about $182 per square foot	$ 5,000	
(b) DOE and construction contractor space, approximately 37,500 square feet at about $80 per square foot	3,000	
(3) Special facilities	32,760	
(4) Utilities, including electrical power, water, steam, and sanitary sewer lines	500	
c. Equipment		4,700
Subtotal		$54,660
d. Contingency at approximately 24 percent of the above costs		13,340
Total estimated cost		$68,000

11. Method of performance

To the extent feasible, design will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

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a/ Estimates based upon a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Y-12 Plant, Oak Ridge, Tennessee
2. Project No.: 84-D-211

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$20,200	$27,600	$16,900	$ 3,300	$68,000
Total facility cost	20,200	27,600	16,900	3,300	68,000
2. Other project funding					
(a) Conceptual design costs	200	0	0	0	200
Total other project cost	200	0	0	0	200
Total project costs (Items 1 and 2)	$20,400	$27,600	$16,900	$ 3,300	$68,200

b. Other related funding requirements (estimated life of project: 15 years)

1. Facility operating costs	$ 1,924
2. Programmatic operating expenses directly related to the facility	7,696
Total other related annual funding requirements	$ 9,620

13. Narrative explanation of total project funding and related funding requirements

a. Total project funding

1. Other project cost

(a) Conceptual design costs

Approximately $200,000 was required to prepare a conceptual design, preliminary schedule, and cost estimate for this project.

b. Other related funding requirements

1. Facility operating costs

Facility operating costs of $1,924,000 are projected to cover the cost of maintenance, utilities, and overhead for the project.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrading, Y-12 Plant, Oak Ridge, Tennessee
2. Project No.: 84-D-211

13. Narrative explanation of total project funding and related funding requirements (contd.)

2. Programmatic operating costs

Programmatic operating costs estimated at $7,696,000 annually will cover the necessary manpower, materials, and overhead to support this project.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Safeguards and site security upgrade, Pinellas Plant, Florida

2. Project No.: 84-D-212

3. Date A-E work initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 1st Qtr. FY 1986

4. Date construction ends: 1st Qtr. FY 1988

5. Previous cost estimate: $ 7,500
Date: 1/85

6. Current cost estimate: $ 7,500
Date: 1/86

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 1,000	$ 0	$ 0	$ 0
1985	2,700	1,850	1,850	747
1986	3,800	4,650	4,650	3,253
1986 Sequestered	(0)	(280)	(280)	(0)
1987	0	1,000	1,000	3,000
1988	0	280	280	500

8. Brief physical description of project

This project provides for the construction of a new security/communications center which is necessary to enhance the safeguards and security at the Pinellas Plant. This project also includes procurement and installation of equipment to make the center operational and to upgrade site security which includes alarms, CCTV monitors, and security force vehicles. In addition, this project provides for construction of new site security roads, required drainage capability, a new 30,000-square foot parking lot, and truck trap for security at the northeast plant entrance.

The new facility will be one story, approximately 100 feet by 300 feet, with a gross area of approximately 30,000 square feet. The facility will be a combination of hardened and unhardened construction. The hardened construction will be concrete floors, walls and ceilings; unhardened construction will be concrete floors, masonry walls, structural steel framing, and metal roof deck. Utilities will be connected to the existing plant systems.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrade,
Pinellas Plant, Florida

2. Project No.: 84-D-212

8. Brief physical description of project (contd.)

The facility will provide space to support the security operations which have expanded in size and scope of responsibilities. This space will provide for the following needs:

a. Change rooms, showers, restrooms, and break area for the increasing staff and provide separate rooms for men and women.

b. Training rooms to conduct demonstrations, lectures, and shift change briefings on an around-the-clock basis. This is attributed to the increased variety and depth of training coupled with the increased number of security inspectors.

c. Additional office space to accommodate the additions to the security professional and supervisory staffs.

d. Indoor firing range will permit day and night firing and will not restrict practice due to inclement weather. The range will also eliminate community concerns arising from the noise of gunfire and potential stray or ricocheting bullets associated with outdoor ranges.

e. A hardened communication center is required to house security alarm and monitoring hardware, expanded communications systems, and to permit centralized operator control.

f. An armory is planned to store the firearms of off-duty inspectors, as well as ammunition, extra firearms, and backup and auxiliary weapons. It is necessary to harden this facility to the point that such equipment cannot easily be seized by an intruder.

g. An exercise area to permit conditioning and controlled physical fitness testing of guard force personnel.

h. A technical security and countermeasures workshop/storage room for technical and electronic security equipment.

i. A garage area capable of housing armored and other security vehicles.

j. "Ready Room" to accommodate the large shift staffing and storage of response equipment.

It is necessary to control individual movement into, within, and out of the plant site. This facility will meet the requirements of the new security force, the need to house properly the increased security force, provide proper training facilities for the security force, and the need to replace outmoded security center equipment with state-of-the-art equipment. The need exists for: (1) a properly trained and equipped security force adequate to carry on the day-to-day control of

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrade, Pinellas Plant, Florida

2. Project No.: [illegible]

6. Brief physical description of project (contd.)

movement of people, vehicles, equipment, material, and classified information; and (3) a response capability that will detect, delay, and contain intruders.

The FY 1987 funding will fully fund the project and allow completion of construction of roads and parking area.

7. Purpose, justification of need for, and scope of project

Construction of this new building is required to provide the additional space needed as a result of the ongoing enhancement of Pinellas Plant security operations, expansion of the security force, and the increased needs of security. Existing site facilities are inadequate to accommodate the intensified requirements and growth of the security force. [illegible] current guidelines and requirements. Failure to implement this project would result in significant curtailment of the planned Pinellas Plant security enhancement. Improved site security requirements include the following items which relate to this new construction project:

a. The existing security guard force size must be approximately tripled.

b. The amount of onsite weaponry and ammunition must be increased.

c. The quantity of alarm, monitoring, and communication equipment must be increased.

d. Classroom and practical training sessions must be intensified for all security force personnel.

e. The amount of actual weapons firing training and evaluation must be increased for all security guards.

f. All security force personnel will be required to achieve and maintain Department of Energy (DOE) specified physical fitness standards for guard force members.

g. The security hardware and communication systems must be protected in hardened enclosures and provided with redundant support auxiliaries sufficient to ensure continuity of operation during emergency conditions.

h. The guard force must be located in such a manner as to facilitate rapid response to any area of the site.

New site roads are necessary to aid in response time to remote buildings and perimeter areas of the plant. These roads will help to increase surveillance capabilities in areas that become difficult to reach during the summer rainy season.

The new 45,000-square-foot parking lot will have room for approximately 300 cars. This lot will be used primarily for visiting law enforcement agencies personnel. Local supporting police and sheriff's departments will be able to utilize the

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrade, Pinellas Plant, Florida　　2. Project No.: [illegible]

8. Purpose, justification of need for, and scope of project (contd.)

firing range. They will also be attending unclassified briefings and training sessions so as to familiarize them with site layouts and functions. These actions are necessary should the plant require their services in a crisis situation. This parking area will aid in the control of nonemployee vehicles within plant confines.

A truck trap will be designed and installed at the plant's northeast entrance. This trap is needed to prevent unauthorized entry by a speeding vehicle and would be the plant's first line of protection from such an occurrence.

9. Details of cost estimate a/

	Item cost	Total cost
a. Engineering, design, and inspection at approximately 19 percent of construction costs, item b		$ 820
b. Construction costs		4,420
(1) Improvements to land	$ 762	
(2) Building	[illegible]	
(3) Utilities	[illegible]	
c. Standard equipment		[illegible]
Subtotal		[illegible]
d. Contingency a/ at approximately 20 percent of above costs		[illegible]
Total estimated cost		$7,500

10. Method of performance

Design and engineering will be performed under an architect-engineer contract. Construction will be accomplished by fixed-price contract awarded on the basis of competitive bids and administered by the operating contractor. Standard equipment will be procured and installed by the operating contractor.

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a/ Based upon a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and site security upgrade, Pinellas Plant, Florida

2. Project No.: 84-D-212

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	Total
a. Total project costs				
1. Total facility costs				
(a) Construction line item	$ 4,000	$ 3,000	$ 500	$ 7,500
Total facility cost	4,000	3,000	500	7,500
2. Other project funding				
(a) Conceptual design costs	180	0	0	180
Total other project funding	180	0	0	180
Total project funding (Items 1 and 2)	$ 4,180	$ 3,000	$ 500	$ 7,680

b. Other related funding requirements	
1. Facility operating costs	$ 45
Total other related annual costs requirements	$ 45

13. Narrative explanation of total project funding and related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design costs
Approximately $180,000 is required to prepare the conceptual design.

b. Other related funding requirements

1. Facility operating costs

Facility operating costs of $45,000 are projected to cover the cost of maintenance and utilities for the project.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1989

5.	Previous cost estimate:	$1,247,000
	Less prior projects:	211,000
	Net cost estimate:	$1,036,000
	Date: 1/85	
6.	Current cost estimate:	$1,257,475
	Less prior projects:	211,000
	Net cost estimate:	1,046,475 a/
	Date: 1/86	

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 87,500	$ 66,000	$ 65,899	$ 18,487
1983	132,900	154,400	154,405	71,584
1984	185,000	185,000	185,057	130,265
1985	165,000	163,754 b/	163,765	173,775
1986	170,000	160,500	160,500	165,778
1986 Sequestered	(0)	(8,250)	(8,250)	(0)
1987	153,400	116,900	116,900	145,088
1988	152,675	163,696	163,724	208,411
1989	0	44,475	44,475	133,087

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a/ The total project cost is estimated at $1,257,475,000 in FY 1987 dollars. The increased cost is due to escalation. Other restoration projects have been initiated which collectively have an estimated cost of $211,000,000 (FY 1980 Research, Development, and Testing (RD&T) capital equipment and Project numbers 79-7-n, 80-AE-6, 81-D-107, and 81-D-116). Therefore, the total estimated cost (TEC) of this line item project is $1,042,000,000 in FY 1987 dollars. The TEC assumes that adequate capital equipment and general plant project funding will be received in FY 1987 and future years to prevent the further deterioration of equipment and utilities in the nuclear weapons complex.

b/ Reflects management initiative reduction of $1,246,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

8. Brief physical description of project

This project is a continuation of a multiyear program for restoration of utilities and capital equipment at the seven weapons production plants, the three weapons laboratories, and the Nevada Test Site. The project will provide for replacement of utilities and equipment that, in progressing at their normal life cycle, have deteriorated to the point that their physical condition is poor or is no longer technologically satisfactory. Appraisals of the physical condition and technological adequacy of utilities and equipment in use in the nuclear weapons production, research, development, and testing complex have been completed, and the complex has identified poor and inadequate items that should be replaced in order to meet current and future weapons program requirements. These utilities and equipment require correction due to (a) consistent substandard performance, (b) excessive maintenance costs, (c) continually threatening scheduled operations by breakdown, and (d) not being fully capable of meeting program requirements or performing at required confidence levels. These restoration efforts will be accomplished at the Y-12 Plant, Rocky Flats Plant, Bendix Plant, Mound Plant, Pantex Plant, Savannah River Plant, Pinellas Plant, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratories, and the Nevada Test Site.

The TEC increased by $6,000,000 with the application of the most current escalation rates, after accounting for changes to our planned funding schedule identified in the FY 1986 budget request.

The FY 1987 funding requested is $116,900,000: $79,100,000 will be used to continue design, procurement, and construction of utilities and equipment at the weapons production complex; $30,200,000 will be used to continue design, procurement, and construction of the critical utilities and equipment at the three weapons laboratories; and the remaining $7,600,000 will be used for restoration efforts at the Nevada Test Site.

9. Purpose, justification of need for, and scope of project

The Department of Energy (DOE) is responsible for the production and lifetime surveillance of safe and reliable nuclear weapons in support of United States national security. Thus, it is the mission of weapons production to provide for: (1) manufacturing capabilities and capacities required for the production of nuclear warheads, projectiles, and bombs approved by the President and planned for future enhancement of United States nuclear forces; (2) the surveillance and certification of the technical quality of nuclear weapons in the existing stockpile; (3) the provisioning of limited-life components; and (4) reviewing jointly with the Department of Defense (DOD) the safety of operating and handling procedures. During the 1980's, the annual workload for this mission is greater than the workload experienced in the late 1970's.

The primary missions of the DOE's nuclear weapons RD&T activities are: (1) to sustain international leadership in new ideas and technologies essential to maintain modern nuclear forces capable of responding to threats against the United States national security; and (2) to design, develop, and certify nuclear weapons approved by the President for DOD delivery systems.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

9. Purpose, justification of need for, and scope of project (contd.)

Concern has developed at the Office of Military Application and field operations offices over the past few years that the nuclear weapons production, laboratory, and testing facilities have deteriorated to such a condition that the probabilities of failures that could cause production stoppages have increased to the point that planned workloads and schedules for the 1980's may not be met. Further, the deterioration of the laboratory and testing facilities increases the risk of diminishing the United States superiority in nuclear weapons technology.

During calendar years 1977 and 1978, members and staff of the Senate Armed Services Committee (SASC) and the House Armed Services Committee (HASC) made extensive visits to nuclear weapons production, research, development, and testing facilities. They recognized that a deficiency in production facilities and the research and development laboratories had built up over the years. It was observed further that, while this problem was acknowledged, there was no comprehensive program designed to alleviate the problem systematically. Chairman Price of the HASC, in a letter to Dr. Schlesinger on January 6, 1978, requested further information on existing studies, budget history, estimated total cost to replace obsolete equipment and utilities, a reasonable estimate for replacement costs, and DOE plans to restore such deficiencies. A SASC staff member's report to Chairman Stennis on his inspection of DOE weapon facilities was instrumental in the FY 1979 authorizing legislation requirement that the Secretary of Energy conduct a study of the status of all Government-owned, contractor-operated plant, capital equipment, facilities, and utilities which support the United States nuclear weapons program; and to submit the results of such a study to the Congress at the same time the DOE authorization request for FY 1980 was submitted to the Congress.

Recognizing that a problem existed, a study was initiated in early CY 1977 to determine the extent of deterioration of equipment and utilities at the nuclear weapons production plants prior to the increased workload expected in the 1980-87 time period. The results were issued in a report dated November 1, 1977, entitled "An Appraisal of Physical Condition and Technology Status of Equipment and Utilities Systems in the Weapons Production Complex." This appraisal formed the basis for determining an estimate of $300,000,000 to be the net accumulated degradation in FY 1980 in the production and surveillance complex.

In December 1977, a similar appraisal was initiated to determine the status of equipment and utilities at the nuclear weapons laboratories and the Nevada Test Site. The research, development, and testing study concluded that the cost of equipment and utilities which need replacement to assure an efficient and capable complex to perform nuclear weapons research, development, and testing amounted to approximately $295,000,000 in FY 1980 dollars. Thus, the total estimate of upgrading the whole weapons complex was stated as $595,000,000 in FY 1980 dollars. Subsequent to these appraisals, the DOE Controller was tasked to conduct an independent assessment of the appraisals. This assessment primarily concluded that: (1) degradation in the weapons complex was serious, (2) the appraisal method was technically sound, (3) some of the samples contained excess equipment that should have been purged prior to determining the estimated cost of replacement, and (4) the replacement cost was used when less costly alternatives existed for upgrading the capability. The Controller's estimate, based on these findings, was $451,000,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

5. Purpose, justification of need for, and scope of project (contd.)

On January 25, 1979, the Assistant Secretary for Defense Programs provided a report to the Congress on the results of the studies. As part of this study, the DOE proposed to undertake the correction of these deficiencies with a multifaceted program over the next several years. This included: (a) annual appraisals of the technical and physical status of the United States nuclear weapons capability and the progress being made to correct the existing deficiencies, (b) improving the precision of the appraisal techniques, and (c) developing annual funding requirements through the normal budgetary procedures as part of a multiyear restoration program.

The second appraisal of the nuclear weapons complex indicated that the condition of the complex continued to deteriorate and that the accumulated degradation had grown to $787,300,000 in FY 1981 dollars. This increase over the previous estimate was caused primarily by four factors: (1) engineering-type estimates for repair or replacement costs were used rather than estimates based on Bureau of Labor Statistics escalation indices; (2) inclusion of the appraisal of interior building services at all sites; (3) an additional year's degradation from the previous appraisal; and (4) an additional year's escalation on the restoration costs for those items found to be physically poor or technologically inadequate. As was done for the first appraisal, the Controller conducted an independent assessment of the appraisals. The Controller's assessment once again verified the seriousness of the degradation in the weapons complex and that the relative growth in the estimate was justified. However, the Controller's estimate for the accumulated degradation was $674,000,000 in FY 1981 dollars.

Three appraisals have now been completed and indicated the problem had grown to $969,[illegible],000 in FY 1982 dollars. Although the Controller's office did not conduct a third independent assessment, a comparable estimate of $867,000,000 was developed utilizing the results of the Controller's second assessment; estimating the amount of additional deterioration, including the higher escalation rates being experienced; and expressing this estimate in FY 1982 dollars. Allowing for the additional deterioration continuing to be experienced due to the continued underfunding of capital equipment and general plant projects and expressing the Controller's estimate in FY 1987 dollars yields a current estimate of $1,203,400,000. The DOE now proposes an eight-year program for the correction of the identified production and testing complex deficiencies, and a nine-year funding program for the research and development complex. The funding requested for this project is a part of that program.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: [illegible] 2. Project No.: [illegible]

10. Details of cost estimate [illegible]

	Item cost
a. Engineering, design, and inspection	
b. Construction costs	
(1) [illegible]	
(2) [illegible]	
(3) [illegible]	
c. [illegible]	
d. [illegible]	[illegible]
e. Contingency	
Total estimated cost	[illegible]

11. Method of performance

[illegible]

12. Funding schedule of project funding and other related funding requirements

	[illegible]	[illegible]	[illegible]	[illegible]	Total
a. Total project funding					
1. [illegible]					
(a) [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2. [illegible]					
(a) [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(b) [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total project funding [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
[illegible]

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
MATERIALS PRODUCTION
Atomic Energy Defense Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Materials Production (DP)	FY 1985 Approp.	FY 1986 Adjusted Approp. i/	FY 1987 Base	FY 1987 Request	Request Vs. Base
Operating Expenses					
Reactor Operations	$ 509,241 c/	$ 541,098	$541,098	$ 616,660	$ 75,562
Processing of Nuclear Materials	432,870	464,832	464,832	499,830	34,998
Supporting Services	275,985	249,946	249,946	252,500	2,554
Enriched Material	142,800	169,600	169,600	204,500	34,900
Program Direction	19,980 a/b/	22,276 b/g/	22,276	22,900	624
Subtotal Operating Expenses	$1,380,876	$1,447,752 f/h/	$1,447,752 f/h/	$1,596,390	$148,638
Capital Equipment	104,157 c/d/	109,540	109,540	126,090	16,550
Construction	260,302 d/	214,265 e/g/	214,265	343,666	129,401
Reduction from Prior Year Unobligated Construction Projects	0	-3,408	-3,408	0	3,408
Total Materials Production	$1,745,335	$1,768,149	$1,768,149	$2,066,146	$ 297,997
Full-Time Equivalents (FTE's)	327	337	337	348	11
Headquarters	52	48	48	48	0
Savannah River	275	289	289	300	11

Authorization: Section 31, P.L. 83-703

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a/ Reflects comparability adjustment reduction of $297,000 and 5 FTE's in FY 1985 for the transfer of environmental, safety, and quality assurance functions to Weapons Activities Program Direction due to reorganization.

b/ Reflects comparability adjustment reduction of $23,000 and one FTE in FY 1985 and $24,000 and one FTE in FY 1986 for the transfer of the Materials Production mailroom function to Military Application program direction due to reorganization.

c/ Reflects recission of $995,000 in accordance with Section 2901, Public Law 98-369. The allocation of this reduction is $394,000 operating expenses and $601,000 capital equipment.

d/ Reflects reduction of $1,402,000 capital equipment and $4,198,000 construction for distribution of FY 1985 management savings.

e/ Reflects a proposed transfer appropriation reduction of $634,000 to Departmental Administration for general FTE clerical reduction.

f/ Reflects a reduction of $5,675,000 in FY 1986 and $4,200,000 in FY 1987 as Materials Production's share of Management Savings initiatives for the Atomic Energy Defense Appropriation.

g/ Reflects $1,000,000 proposed reprogramming for pay cost restoration in FY 1986. Funds are provided from prior year construction projects.

h/ Reflects proposed appropriation transfer reduction of $1,517,000 to the Energy, Supply Research and Development Appropriation for FY 1986 environmental assessment activities.

i/ Reflects $92,651,000 sequestered to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (P.L. 99-177).

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
  1. Total facility costs
    (a) Construction line item

Total excludes prior-year projects estimated at $211,000,000.

  2. Other project funding
    (a) Conceptual design

Conceptual design cost of $3,311,000 is necessary to develop a budget quality cost estimate and construction schedule.

    (b) Other project related costs

$650,000 is required for Rocky Flats' subprojects for health physics monitoring.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Production and Surveillance
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, Various Locations

2. Project No.: 82-D-109

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 1st Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: $40,000
Date: 1/85

6. Current cost estimate: $40,000
Date: 1/86

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7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 35,000	$ 15,000	$ 14,850	$ 1,726
1983	0	0	149	5,785
1984	0	0	1	3,772
1985	50,000 a/	0	0	2,754
1986	0	15,000	15,000	6,000
1987	0	10,000	10,000	9,000
1988	0	0	0	10,963

8. Brief physical description of project

This project will provide additional equipment, building modifications, and special facilities needed for production and certification of components, subassemblies, and final assembly of the W82 warhead for the new 155mm artillery fired atomic projectile.

Production of the new 155mm AFAP requires revised or expanded capabilities at various production plants. Following are examples of equipment and facility modifications that are expected to be provided under this project: (1) equipment for manufacturing the high strength projectile case and nuclear components; (2) equipment for grinding, joining, and plating

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a/ The Department of Energy's National Security and Military Applications of Nuclear Energy Authorization Act of 1985, Section 1635(a), provides authorization of $50,000,000 after September 30, 1984, for the construction of facilities necessary to produce the 155mm AFAP.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, Various Locations

2. Project No.: 82-D-109

8. Brief physical description of project (contd.)

projectile components; (3) facilities for fabrication and assembly, inspection, testing, and certification of projectile component subassemblies and final assemblies; (4) minor building additions for housing environmental and testing equipment; (5) building modifications necessary to accommodate new equipment and process installations; and (6) equipment for machining.

Utilities will be provided by extension of existing services within existing buildings.

Existing weapon production plants that will require building modifications or new equipment installations include the Bendix Plant, Kansas City, Missouri; the Pantex Plant, Amarillo, Texas; and the Y-12 Plant, Oak Ridge, Tennessee.

The requested FY 1987 funding will complete this project.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide new capabilities and additional production capacity needed to meet established production requirements for the W82 warhead.

Maximum use will be made of existing manufacturing capabilities and capacities in preparing for production of the 155mm AFAP. However, unique features [illegible] the new weapon will require capabilities not currently available in the production plants. The additional number of pa[illegible] added to the production workload will require additional capacity at the production plants.

The new 155mm AFAP will be designed with improved firing characteristics and extended range and will replace the existing W48 projectile. This agency and the Department of Defense agreed to Phase 3 development engineering activities in February 1978.

The projectile size (6.2 inches diameter) and the severe gun-firing environments will require difficult processing methods to further miniaturize components and to ensure that the components meet design specifications.

Manufacturing and process uncertainties that remain to be resolved by the production complex to ensure design specifications are met include machining a critical structural feature within the projectile. Provision is made in the cost estimate for these and other unresolved minor manufacturing and process uncertainties.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, Various Locations

2. Project No.: 82-D-109

10. Details of cost estimate a/

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 33 percent of construction costs, item b		$ 6,000
b. Construction costs		18,000
(1) Special facilities	$18,000	
c. Standard equipment		12,777
Subtotal		$36,777
d. Contingency at approximately 5 percent of above costs		1,700
e. Production process uncertainties		1,523
Total estimated cost		$40,000

The estimates by location are as follows:

Bendix Plant, Kansas City, Missouri	$ 9,100
Pinellas Plant, St. Petersburg, Florida	1,100
Pantex Plant, Amarillo, Texas	2,500
Rocky Flats Plant, Golden, Colorado	9,600
Mound Plant, Miamisburg, Ohio	6,577
Y-12 Plant, Oak Ridge, Tennessee	7,900
Contingencies and process uncertainties	3,223
Total	$40,000

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

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a/ Estimate based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, Various Locations
2. Project No.: 82-D-109

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1987	FY 1988	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$20,037	$ 9,000	$10,963	$40,000
Total facility cost	$20,037	$ 9,000	$10,963	$40,000
2. Other project funding				
(a) Conceptual design	120	0	0	120
Total other project funding	120	0	0	120
Total project funding (items 1 and 2)	$20,157	$ 9,000	$10,963	$40,120
b. Other related funding requirements (estimated life of project: 10 years)				
1. Facility operating costs				$ 3,500
2. Programmatic operating expenses directly related to the facility				11,650
Total other related annual funding requirements				$15,150

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
   1. Other project funding
      (a) Conceptual design

Conceptual design costs of approximately $120,000 were incurred in the process of developing and improving the project cost estimate and schedule.

b. Other related funding requirements

It is estimated that the programmatic life of this facility will be 10 years.

1. Facility operating costs

Facility operating costs of approximately $3,500,000 per year are projected to cover the costs of utilities, maintenance, janitorial services, and related overhead.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, Various Locations

2. Project No.: 82-D-109

13. Narrative explanation of total project funding and other related funding requirements (contd.)

2. Programmatic operating expenses directly related to the facility

Programmatic operating costs of approximately $11,650,000 per year are projected to cover the direct labor, material and supplies, tooling procurement, tooling fabrication, and related overhead.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Materials Production
(in thousands of dollars)

FY 1986 Adjusted Appropriation/FY 1987 Base		$1,768,149
Program increases and decreases:		
Operating Expenses		
Reactor Operations		
Increase for escalation of reactor operations operating expenses	+	27,160
Increase at the Fernald Feed Materials Production Center to supply the uranium requirements for fuel elements for the Richland and Savannah River reactors and for phase-in of Westinghouse as the new contractor at Fernald	+	11,085
Increase at Richland for fabrication and irradiation, maintenance, second year funding for the productivity retention program, and for the Production Assurance Program to insure long-term supply of nuclear materials	+	13,634
Increase at Richland for environmental, safety, and health activities	+	3,270
Increase at the Savannah River Plant for fuel fabrication and irradiation	+	6,798
Increase at the Savannah River Plant for essential reactor maintenance to continue operations	+	10,905
Increase at the Savannah River Plant for security	+	2,710
Processing of Nuclear Materials		
Increase for escalation of processing of nuclear materials operating expenses	+	23,220
Decrease at Los Alamos to reflect the transfer of some of weapon-grade plutonium processing efforts to other locations	-	11,365
Increase at Idaho for continued processing of Naval fuels and for the Idaho restoration project for replacement of deteriorating DOE facilities.	+	3,982
Increase at Oak Ridge for the recovery of nonspecification enriched uranium and for the processing of californium-252	+	1,565
Increase at Richland for advanced planning and technology, facility maintenance, and improved security	+	9,375
Increases Special Isotope Separation process technology development efforts with option for future deployment	+	1,100
Increase at San Francisco for fuel decladding activities	-	1,080
Increase at the Savannah River Plant for increased fuel separation, processing of L Reactor materials, and other materials processing	+	8,201

SUMMARY OF CHANGES (continued)

Supporting Services

Increase for escalation of supporting services operating expenses........	+	12,505
Decrease in process development activities at Los Alamos	-	3,359
Decrease in startup costs at Idaho	-	942
Increase at Oak Ridge for rewinding electrical motors at the Portsmouth Gaseous Diffusion Plant, standby support for the Oak Ridge Gaseous Diffusion Plant, weapon program support, and for feasibility and engineering studies..	+	4,007
Increase at Richland primarily for continued support for the Process Facility Modifications project..................................	+	3,085
Decrease at San Francisco for termination of Plasma Separation Process development	-	26,000
Increase at the Savannah River Plant for process development to support production operations; reactor safety analyses and safety developmental support; robotics development; process spares; conceptual engineering; change in inventories, etc......................	+	8,798
Increase at the Savannah River Plant for security activities	+	4,460

Program Direction

Increase in program direction funding to support 11 additional full-time equivalents..	+	624

Enriched Material

Increase for N Reactor separative work requirements	+	5,300
Increase for Naval Reactors separative work requirements	+	29,600

Capital Equipment

Increase for escalation of capital equipment	+	5,605
Decrease at Albuquerque to reflect the need for equipment at other materials production facilities	-	1,411
Decrease at Idaho in the need for equipment for environmental, restoration, and security activities	-	310
Increase at Oak Ridge for weapons support at Y-12, for essential replacement equipment at Fernald to ensure continued supply of feed materials to the reactors, and for improved environmental activities	+	13,100
Increase at Richland for reactor operations, security support, Production Assurance process tube replacement activity, etc.	+	7,121
Decrease at the Savannah River Plant in the need for essential equipment to continue uninterrupted operation of the fuel fabrication, production reactor, and processing facilities	-	3,570
Decrease at San Francisco for the Special Isotope Separation development program	-	3,985

Construction

Net increase in funding for prior year projects, various locations.......	+ 7,131
Reduction from prior year unobligated construction projects.............	+ 3,408
Increase for five new environmental projects, including two new projects at Richland, two new projects at the Savannah River Plant, and one new project at Fernald	+ 23,650
Increased funding to return the Idaho Fuel Processing Facility Restoration (Project 85-D-139) to the minimum level needed to allow continuation of design activities and to initiate long-lead procurement and limited construction activities	+ 21,470
Increase in funding to continue project for expansion and modification to existing fuel processing capabilities at Richland (Project 84-D-135) .	+ 20,525
Increase to continue the program to provide for upgrading of aging facilities and retention of production capabilities at Fernald, Richland, and the Savannah River Plant (Project 86-D-149)	+ 56,625
FY 1987 Request	$ 2,066,146

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars)

Program Overview

The Materials Production program provides nuclear materials to meet near-term national defense and nondefense requirements. In addition, Materials Production sustains a base production program capable of meeting long-term nuclear materials production requirements consistent with the annual Presidential Nuclear Weapons Stockpile Memorandum and the annual Department of Energy (DOE) Materials Management Plan.

The requirements for nuclear materials are based on the stockpile projections contained in the proposed FY 1986-1991 joint DOE/Department of Defense Nuclear Weapons Stockpile Memorandum. Most of the nuclear materials needed for new weapon systems are obtained from retired weapons. However, production of additional nuclear material is required over the next decade to meet stockpile requirements.

DOE's presently programmed production capability includes the four operating production reactors at the Savannah River Plant; N Reactor at Richland, Washington; and blending fuel-grade plutonium with high-purity plutonium specially produced in the Savannah River reactors.

The specific objectives of the Materials Production Program are:

- o Provide nuclear materials for National Defense requirements and for allies under mutual defense agreements;
- o Provide nuclear materials for departmental reactor research and development programs, other government agencies, industry, and foreign governments under civilian agreements for international cooperation;
- o Receive and process nonproduction reactor fuels (e.g., Naval propulsion, research, and materials testing reactors) for recovery of plutonium, enriched uranium, and other materials;
- o Make available sufficient N Reactor byproduct steam to the Washington Public Power Supply System to generate electricity for the Bonneville Power Administration power grid;
- o Recycle nonspecification nuclear materials to recover valuable materials, minimize storage costs, and conserve materials and energy;
- o Maintain operational capability to meet nuclear material needs;
- o Conduct all nuclear materials production related activities in a safe, secure, environmentally-acceptable, energy-efficient and cost-effective manner and in accordance with Departmental environmental protection, safety, health protection and quality assurance orders and directives; and
- o Maintain technical capability to develop process improvements and improved production operations technology.

In addition to these production objectives, DOE plans to utilize available capacity in its Nuclear Materials Production facilities to assist the Office of Military Applications in recovering plutonium from the backlogged inventory of residues and nonspecification plutonium generated in weapon production operations.

Operations

The Materials Production program operates a reactor feed material production complex; production reactors at the Savannah River Plant and Richland; spent fuel and target chemical processing plants at the Savannah River Plant, Richland, and Idaho; and support facilities integral to the operation of the facilities mentioned above. These facilities are unique to the production of nuclear materials for defense purposes. There is no cost effective alternative production method within the United States, at present or within the production planning period, for providing the nuclear materials required by the national defense program, other Federal programs, and industry.

The Oak Ridge Y-12 Plant processes highly-enriched uranium that is recovered from spent Naval and research reactor fuels at Idaho or uranium recovered at the Savannah River Plant from spent production or research reactor fuels. This enriched uranium is then shipped to the Savannah River Plant where it is alloyed with aluminum and fabricated into fuel tubes for subsequent reactor charging with enriched lithium targets for tritium production or depleted uranium targets for plutonium production. The irradiated enriched uranium fuel is processed at the chemical processing plant at the Savannah River Plant for recovery and recycle of the remaining enriched uranium.

At Fernald, Ohio, depleted uranium is processed into metallic uranium and cast into cylinders. These castings are shipped to Ashtabula, Ohio, for extrusion into long rods. These rods are returned to Fernald for manufacturing into target cores. The uranium cores are shipped to the Savannah River Plant, clad with aluminum and prepared for loading into the Savannah River Plant reactors. After irradiation within the reactor, targets are stored temporarily in onsite facilities prior to being processed in the Savannah River Plant's chemical processing plant to recover plutonium and tritium for weapons use. Other reactor products used for defense, research, medical and commercial applications are also recovered during the processing operation.

The N Reactor at Richland uses slightly-enriched uranium fuel to power the reactor and to provide steam to the Washington Public Power Supply system for electricity generation. To obtain fuel for the Richland reactor, slightly enriched uranium is converted to metal and cast into ingots at the Fernald plant, extruded into cylindrical billets at Ashtabula, Ohio, and shipped to the fuel fabrication facilities at Richland, Washington. The billets are clad with zirconium and extruded to provide finished fuel elements for the reactor. After irradiation within the reactor, the spent fuel is removed and temporarily stored onsite prior to being processed in the Richland PUREX fuel processing plant.

Spent reactor fuel from naval and research reactors is processed at the Idaho Fuel Processing Facility within the Idaho National Engineering Laboratory at Idaho Falls, Idaho.

Safeguards and Security

The FY 1987 request provides for continued attention to DOE safeguards and security activities. Construction activities increase by $12,484,000 in FY 1987 compared to FY 1986 due to increased design, procurement, and construction activities needed to maintain project schedules. Third year funding of $14,650,000 is requested for the Plantwide Safeguards and Security Improvements project (84-D-134) at the Savannah River Plant to prevent and detect the diversion and/or theft of special nuclear material. Facility improvements are also directed toward prevention of radiological and industrial sabotage, as well as to deny unauthorized access to equipment, material and sensitive information. Second year funding of $13,900,000 is requested for the Plantwide Safeguards Systems project (86-D-156) for the Savannah River Plant that will provide upgrades to broad areas of physical security alarm systems, personnel/vehicle access controls, and special nuclear material accountability. The total FY 1987 request for safeguards and security is $159,335,000, an increase of $26,006,000 over FY 1986.

The safeguards and security budget for FY 1987 has been formulated as part of an agency-wide effort to continue efforts to correct remaining deficiencies and establish effective systems. The safeguards and security program is essential for continuation of the Nuclear Materials Production Program, the protection of public health and safety, and national security.

The revised threat guidance, inspections, and investigations have produced an immediate need for increased funding to improve the safeguards and security of key facilities and nuclear materials.

Environmental Support

The FY 1987 request provides funds for environmental activities at the Savannah River Plant including: (1) elimination of the potential for future contamination of ground and surface waters from radioactive and hazardous industrial waste discharges; (2) expanded monitoring, evaluation and cleanup of existing ground water contamination; (3) engineering studies to deactivate and decontaminate the chemical separations area seepage basins; and (4) thermal mitigation of reactor discharges. These activities are consistent with the Groundwater Protection Plan for the Savannah River Plant, which was submitted by the Department to Congress in FY 1984 pursuant to Public Law 98-181. The requested funding is required to implement the Ground Water Protection Plan, to conduct planned environmental evaluations, and to define and undertake mitigation actions, consistent with DOE consent orders with the State of South Carolina.

Funds are requested to initiate environmental activities at Richland that will address and resolve problem areas that have been receiving increased public, State and Federal Government attention. To comply with agreements with the State of Washington, DOE must take the steps necessary to reduce chemical discharges to the process sewers at the fuel fabrication facility. In addition, to comply with DOE order requirements, the design of a facility to process radioactive effluent from N Reactor must be initiated to eliminate discharges to the ground as soon as possible.

Funds are also requested to continue activities at the Fernald and Ashtabula, Ohio, fuel fabrication sites to resolve environmental problems that have been receiving increased public, State, and Federal Government attention.

Funds are included both in FY 1986 and in FY 1987 for Atmospheric Release Advisory Capability services.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Materials Production	$1,768,149	$2,066,146
I. Operating Expenses	$1,447,752	$1,596,390
A. Reactor Operations	$ 541,098	$ 616,660

The FY 1987 request for reactor operating expenses provides for necessary operation of production reactor feed plants at Fernald and Ashtabula, Ohio, and Oak Ridge, Tennessee; N Reactor, fuel fabrication and support facilities at Richland, Washington; and four production reactors (P, K, C, and L), fuel fabrication and support facilities at the Savannah River Plant near Aiken, South Carolina.

Of the increase in reactor operations, $27,160,000 is for escalation, and $48,402,000 is for programmatic activities.

Oak Ridge

The FY 1987 request at Oak Ridge is $11,085,000 above the FY 1986 adjusted appropriation. The increase will provide the necessary level of fuels for the Richland and Savannah River reactors and reflects the Department's attention to environmental problems at Fernald and Ashtabula, Ohio.

In FY 1987, slightly-enriched uranium billets will be produced for the Richland N Reactor to support the weapon-grade plutonium production mode, an increase over FY 1986 deliverables which were decreased by a labor strike action. The Fernald, Ohio, Feed Materials Production Center (FMPC) and the Ashtabula, Ohio, Extrusion Plant will deliver uranium for the Savannah River Plant Mark 16/31 cores in FY 1987 to support reactor operations.

Also, the Fernald FMPC will make a significant number of improvements in air filtration systems, water pollution controls, worker health and safety related upgrades, and in environmental monitoring equipment to satisfy a DOE public commitment to improve conditions at the FMPC that have recently drawn adverse national attention. Additionally, a new site contractor will take over during FY 1986 and will significantly increase staffing levels in the areas of safety, health, and environment.

At the Oak Ridge, Tennessee, Y-12 Plant in FY 1987, highly enriched uranium from nonproduction fuels processed at the Idaho Fuel Processing Facility and highly enriched uranium from production fuels processed at the Savannah River Plant are to be converted to metal form for reuse as fuels in the Savannah River Plant production reactors and for use in the weapons program. This recycle of recovered highly enriched uranium conserves virgin highly enriched uranium recovered from recycled weapons and held in DOE material inventories. Highly enriched uranium metal will be shipped to the Savannah River Plant to support reactor operation.

Richland

An additional $16,904,000 over planned FY 1986 funding is requested in FY 1987 for Richland. Of the increase, $3,270,000 is for environmental, safety and health activities. The remainder of the request is for N Reactor operations, plant maintenance, productivity retention project support, and for production assurance activities.

The Richland N Reactor will produce weapon-grade plutonium in FY 1987. The facility will generate about 700 kilomegawatt days of thermal energy and will also deliver byproduct steam to the Washington Public Power Supply System to generate up to 3.6 billion kilowatt-hours of electricity for the Bonneville Power Administration power grid. Steam revenues for FY 1987 are expected to be about $54,400,000.

In support of N Reactor operations, the Richland fuel fabrication facility will produce finished fuel.

In FY 1987, Richland will continue a program at an operating expense level of $3,500,000 to develop improved reactor refueling capability for increased charge/discharge safety and greater operational efficiency. Reactor maintenance activities will be supported at a level required to preserve productivity reestablished by the restoration project in order to continue the mission of the reactor production facilities into the 1990's.

Funds are provided in the amount of $12,100,000, to support Production Assurance activities for planning, design, plant and reactor systems surveillance and evaluation, technology and fabrication development, and engineering and equipment development. These activities are essential to prepare for replacement of several hundred reactor process tubes that current studies indicate will, during the 1990's, be unacceptable for operation from embrittlement and/or distortion. Failure to replace these tubes beginning in FY 1990 may result in a significant loss of reactor production. These funds also support continued and expanded surveillance, evaluation, development, and planning efforts that address graphite rehabilitation and balance-of-plant upgrades that are essential if the life of N Reactor is to be extended beyond the mid-1990's.

A reactor decontamination that is performed every 2 to 3 years will be conducted for $600,000. Irradiated fuel handling equipment improvements will be achieved for $600,000 to realize cost, exposure, and throughput efficiencies.

Savannah River Plant

The FY 1987 request at Savannah River is $20,413,000 above the FY 1986 adjusted appropriation. These funds will be used to fund increased reactor fuel fabrication and irradiation, a backlog of maintenance, security, and reactor safety.

At the Savannah River Plant, reactor operations consist of all activities directly attributable to the production of nuclear materials in a reactor. The four reactors (P, K, C, and L) will produce weapon-grade plutonium and tritium for the nuclear weapons program, plutonium-238 for both weapons and space applications, and other nuclides for medical and industrial requirements. Within reactor operations, major activities include fuel and target fabrication, irradiation, and reactor safety.

The fuel fabrication facilities produce all the fuel and target elements needed for the Savannah River Plant reactors. Raw materials such as lithium, uranium, neptunium oxide, and aluminum go through various metal working operations such as casting, machining, plating, extruding, and welding as well as inspection operations to produce fuel and target elements for the reactors. Nearly 275,000 slugs, housings, control rods, fuel tubes and target tubes are produced annually by approximately 300 employees. In FY 1987, these facilities will produce fuel and target elements in support of tritium and plutonium production in the reactors. This budget request supports all costs (material, labor, and overhead) associated with operating and maintaining these facilities.

The fuel and target elements shipped to the reactor areas will be irradiated in the four operating reactors to produce weapon-grade plutonium, tritium, Pu-238 and other nuclides. These facilities are also responsible for final assembly of fuel, target, and control rod elements prior to irradiation, for storage of the highly radioactive fuel and target assemblies following irradiation, and disassembly/bundling of tubes and slugs in preparation for shipment to the separation areas for processing. Approximately 1,200 employees are involved in the operation and maintenance of these facilities.

It is projected that four reactors will be operating during FY 1987. The Mark 31 plutonium assemblies discharged will contain a nominal Pu-240 content of about 4.5 percent to support the blending program. Mark 53 assemblies will be irradiated as necessary to produce Pu-238 for defense and research purposes. The operating philosophy is that tritium producing charges will be used to meet tritium requirements first with the balance of the capacity allocated to plutonium production.

The FY 1987 operating expense request includes sufficient funding to operate and maintain both the reactor and fabrication facilities. Programmatic requirements include funding for four reactor operation, maintenance, training, security guards, and contractual commitments.

The reactor safety and reliability program encompasses activities identified in various safety assessments subsequent to the Three Mile Island accident. These include training of reactor operator and supervisory personnel, operating reactor simulators, engineering safety studies, and studies of ways the Department can profit from the lessons the accident taught the nuclear industry. The FY 1987 operating request supports reactor operator and supervisor training, personnel to support the reactor simulator, nondestructive testing of reactor internals, and engineering development of the reactor safety equipment and facilities.

	FY 1986 Adjusted Appropriation	FY 1987 Request
B. Processing of Nuclear Materials	$464,832	$499,830

The FY 1987 request for operating expenses for nuclear materials processing is required to assure that resources are available to meet continuing nuclear materials defense requirements for weapons and research and development programs. Nuclear materials processing activities are carried out at Aiken, South Carolina; Richland, Washington; Idaho Falls, Idaho; Oak Ridge, Tennessee; Los Alamos, New Mexico; and Livermore and Santa Susana, California.

The increase for processing operating expense funds increases by $34,998,000 over FY 1986 levels. This increase is composed of escalation ($23,220,000), Special Isotope Separation activities ($1,100,000), and other programmatic activities ($10,678,000).

Idaho

At Idaho, an additional $3,982,000 for program growth is requested over the FY 1986 level of funding. The increase will continue current operations, provide the scheduled support for the Idaho restoration efforts, and provide for continuation of environmental and security activities.

The Idaho Fuel Processing Facility will continue to receive spent nuclear fuels from the naval propulsion program and fuels from research and test reactors in FY 1987 for recovery of the residual highly enriched uranium. The enriched uranium will be returned to Oak Ridge for future defense program needs. In FY 1987, fuel processing activities will provide recovery of uranium-235.

Spent fuels containing uranium-235 are scheduled to be received at the Idaho Fuel Processing Facility in FY 1987. These fuels will be unloaded from their shipping casks and placed either in underwater fuel storage racks at the Fluorinel fuel storage facility or in dry storage racks at the Graphite Fuels Storage Facility.

Spent fuel dissolution operations in FY 1987 will be conducted in two different head-end processing facilities. The principle dissolution operation will be conducted in the Fluorinel process cell where naval program fuels will be dissolved. Also planned in FY 1987 is operation of the multi-curie cell where smaller quantities of unique fuels and scrap materials will be custom processed.

Uranyl-nitrate solutions from the dissolver operations will be transferred to the solvent extraction facilities located in the CPP-601 building where the uranium will be extracted, purified, and converted to a solid product. An increase of approximately $3,082,000 above FY 1986 levels for processing activities is required to support the manpower, chemical and utility requirements for the increased FY 1987 production.

Success of the planned materials processing operations in FY 1987 requires the direct support of a number of organizations to assure that these operations are conducted in an efficient and safe manner. Direct production support from a variety of disciplines including health physics, quality assurance, engineering, safety analysis, analytical chemistry, maintenance, and safeguards and security provides assurance that fuel processing operations are conducted within acceptable standards. In FY 1987, funds are provided to augment environmental review activities and to increase programs for the reduction of radiation exposure.

Technical support and process development efforts will continue in support of the Fuels Processing Restoration project (85-D-139). This project provides for the replacement of the originally constructed solvent extraction facilities in building CPP-601 and will provide the throughput and reliability required to meet future process requirements. To support this project adequately in FY 1987, an increase of approximately $900,000 is required for efforts in engineering support, long-lead procurement support, process support, and cost and schedule control.

Richland

At Richland, an increase of $9,375,000 over the FY 1986 level is requested for FY 1987. This amount includes increases for advanced planning and technology, facility maintenance, and for security enhancements. Security activities accounts for $4,425,000 of the increase.

The principal mission for Richland nuclear materials processing is providing weapon-grade plutonium metal to the Rocky Flats Plant and fuel-grade plutonium oxide to the Savannah River Plant for blending with high purity plutonium to yield weapon-grade plutonium.

Processing of N Reactor fuel in the PUREX fuel processing plant resumed in FY 1984 and will continue into the late 1990's. While the PUREX plant was in standby condition from 1972 to 1983, irradiated fuel was stored underwater in cooling basins. Stored fuel is being processed at a faster rate than irradiated fuel is discharged from the reactor. In FY 1985 the backlog of fuel containing weapon-grade plutonium was processed except for newly discharged irradiated fuel being stored to allow decay of short-lived fission products.

In FY 1987 the PUREX plant will process fuel containing weapon-grade plutonium which has been stored for 180 days to allow decay of short-lived fission products and fuel containing fuel-grade plutonium. To improve cost effectiveness and reduce transportation demands, facilities for the conversion of weapon-grade plutonium nitrate to metal were restarted in FY 1985 after being in standby for about 12 years. This direct production of plutonium metal at Richland will obviate shipments of plutonium oxide to the

Los Alamos National Laboratory (LANL) for conversion to metal. Fuel-grade plutonium will be provided to the Savannah River Plant for blending. In addition, plutonium metal will be provided directly to Rocky Flats. The uranium recovered during fuel processing operations will be converted to oxide and shipped to the Feed Materials Production Center at Fernald, Ohio, for recycle. Fuel processing activities will be maintained in FY 1987 at about the FY 1986 throughput levels.

Scrap materials containing plutonium arising mainly from the reactivated plutonium metal line and material received from the Rocky Flats Plant will be processed in a cost-effective manner for recovery of the plutonium. Scrap material already in storage as well as scrap material generated from current operations will be processed for plutonium recovery.

Savannah River Plant

In FY 1987, the Savannah River Plant request for processing of nuclear materials is $8,201,000 greater than in FY 1986. The increase is needed primarily for initial operation of the new Special Recovery Facility, and for second-year funding for restart of a facility to process americium-243.

At the Savannah River Plant the reactor fuel and reactor targets discharged from the production reactors are cooled for about 6 months prior to processing in the F and H processing areas. The major products of the processing operations are plutonium-239, tritium and plutonium-238. Irradiated fuel is processed to recover enriched uranium for reuse. In FY 1987, highly enriched uranium will be processed.

During FY 1987, processing operations will separate high purity plutonium produced in the production reactors in FY 1986 for blending with fuel-grade plutonium from the Richland PUREX plant to produce weapon-grade plutonium. The processing of weapon-grade plutonium will increase. Tritium will continue to be extracted from irradiated lithium targets, separated from other gases and purified. Production and processing of plutonium and tritium will be carefully managed to meet requirements delineated in the Nuclear Weapons Stockpile Memorandum. Continued efforts will be made to maximize processing of nonspecification plutonium material to recover and purify the plutonium to produce weapon-grade plutonium metal product.

Funds are required to support the increased workload for processing the fuels and targets from the production reactors and to produce the nuclear materials required to meet the Nuclear Weapons Stockpile Memorandum. The processing plant workloads are greater in FY 1987 than in FY 1986 because this is the first year since 1968 when the fuel and targets from a full year's operation of as many as four production reactors have been available for processing. These workloads, in turn, require increased plant maintenance, quality assurance, and employee training in order to maintain safe, reliable production. Environmental activities will include monitoring, evaluation, and cleanup of groundwater contamination. Engineering studies will be performed on the deactivation and decommissioning of separation area seepage basins. To assure future environmentally acceptable facility operation, the request includes continuation of an FY 1986 project (86-D-154) for construction of an effluent treatment facility to treat radioactive and hazardous discharges.

The Central Scrap Management Office will continue management of the recovery of plutonium-238 and plutonium-239 from scrap from various production sites. Plans are for the Special Plutonium Recovery Facility project (87-D-201) to be operational by mid-FY 1987 for processing scrap and residues to recover the plutonium in a cost effective manner. In FY 1987, approximately $3,675,000 is included for first year Special Recovery Facility operations. Recovery of plutonium from scrap and residues is very cost-effective in comparison to the cost of producing new plutonium.

Department of Energy
FY 1987 Congressional Budget Request
Adjustments to FY 1986 Appropriations

Materials Production (DP)	FY 1986 Confer.	General Reduction	Pay Cost Restoration	FTE General Reduction	Gramm-Rudman-Hollings	ES&H Transfer/ Reprogramming	Subtotal	Comparability Adjustments	Adjusted Approp. Total
Operating Expenses									
Reactor Operations	$ 576,380	$ -5,675	$ -	$ -	$-29,090	$ -1,517	$ 541,098	$ -	$ 541,098
Processing of Nuclear Materials	483,145	-	-	-	-18,313	-	464,832	-	464,832
Supporting Services	256,575	-	-	-	-6,629	-	249,946	-	249,946
Enriched Material	184,000	-	-	-	-14,400	-	169,600	-	169,600
Program Direction	21,300	-	+1,000[a/]	-	-	-	22,300	-24	22,276
Subtotal, Operating Expenses	1,521,400	-5,675	+1,000	-	-67,432	-1,517	1,447,776	-24	1,447,752
Capital Equipment	121,440	-	-	-	-11,900	-	109,540	-	109,540
Construction	225,810	-	-1,000	-634	-11,545	-	212,631	-	212,631
Subtotal, Materials Production	1,868,650	-5,675	0	-634	-90,877	-1,517	1,769,947	-24	1,769,923
General Reduction:									
Operating Expenses	-5,675	+5,675	-	-	-	-	-	-	-
Capital Equipment	-	-	-	-	-	-	-	-	-
Construction	-	-	-	-	-	-	-	-	-
Total, General Reductions	-5,675	+5,675	-	-	-	-	-	-	-
FTE Reduction	-634	-	-	+634	-	-	-	-	-
Use of Prior Year Balances (Materials Prod.)									
Operating Expenses	-	-	-	-	-	-	-	-	-
Capital Equipment	-	-	-	-	-	-	-	-	-
Construction	-	-	-	-	-1,774	-	-1,774	-	-1,774
Total, Prior Year Bal. (Materials Prod.)	-	-	-	-	-1,774	-	-1,774	-	-1,774
Total, Materials Production	$1,862,341	$ 0	$ -	$ 0	$-92,651	$ -1,517	$1,768,173	$ -24	$1,768,149
Operating Expenses	1,515,725	-	+1,000	-	-67,432	-1,517	1,447,776	-24	1,447,752
Capital Equipment	121,440	-	-	-	-11,900	-	109,540	-	109,540
Construction	225,176	-	-1,000	-	-13,319	-	210,857	-	210,857

[a/] Proposed reprogramming to cover pay cost absorption.

Other Sites and Activities

A funding decrease of $11,365,000 is provided for FY 1987 for activities at the Los Alamos National Laboratory compared to FY 1986. The funding decrease reflects the cost-effective completion in FY 1986 of the campaign for converting weapon-grade plutonium oxide from the Richland PUREX plant to plutonium metal for shipment to the Rocky Flats Plant. In FY 1987 the residues from the campaign will be processed for recovery of the plutonium. Activities will continue for the processing of nonspecification plutonium and scrap at Los Alamos to meet program requirements. The funding request will provide for continued independent review and analysis of the safety of new and modified facilities.

In FY 1987, the Materials Management Executive Committee will continue planning and coordinating all intersite activities concerning the use of materials for defense programs. Included in these activities are material shipping, intersite planning and modeling, and exchange of technology between sites.

The FY 1987 request for funds for continuing fuel decladding activities at Santa Susana, California, will decrease by $1,080,000. Decladding provides for a cost-effective means of recovering nuclear materials.

An increase of $1,565,000 is necessary to continue recovery of uranium-235 from scrap and for processing Californium-252 at Oak Ridge.

Special Isotope Separation

In FY 1986, $70,300,000 was provided for Special Isotope Separation research and development. The FY 1987 operating expense request is $74,900,000.

The request provides funding at about the FY 1986 level for research and development on the Special Isotope Separation process and also provides an option for the deployment of this technology at a future date. During FY 1986, the process readiness review requested by the Congress will be completed. The review will provide an updated evaluation of both the Atomic Vapor Laser Isotope Separation process and the Molecular Laser Isotope Separation process being developed by Los Alamos National Laboratory; establish the readiness of these technologies for deployment; and determine which best satisfies Special Isotope Separation production facility requirements.

	FY 1986 Adjusted Appropriation	FY 1987 Request
C. Supporting Services	$249,946	$252,500

Supporting services are essential to maintain production sites' operations at their increased levels and to continue the initiatives to increase production of nuclear material for national defense. Research and development on current operating processes is needed to assure continued, efficient, and safe operation and to meet production goals. This effort includes process optimization to maximize production at minimum unit cost, development of alternative production methods to respond to changes in production and product requirements, development of engineering improvements for fuel handling, environmental protection and safety concerns, etc. With the increase in materials requirements experienced over the last few years, it is essential to maintain an adequate level of research and development.

FY 1987 funds provide startup, shutdown, and standby costs for production facilities needed to meet either current material requirements or possible future requirements. Other supporting services activities include production of lithium compounds and uranium metals for weapons; transportation and security for material shipments; conceptual engineering studies; safety, environmental and safeguards costs; long-range nuclear materials management planning; general site safety improvement activities; warehousing; funding of inventories such as common use stores, process spares, and production of other nuclear materials inventories; and miscellaneous contractor activities such as award fees, employee group insurance, and employee pension funds. Procurement of process spares is essential to assure continued plant operations in the event of equipment failure, especially for fuel fabrication, fuel processing, and reactor refueling.

Of the change, $12,505,000 is for escalation. This results in a net program decrease of $9,951,000. The net decrease is due to the termination of the plasma separation process technology development program at TRW, a contractor directed by the San Francisco Operations Office.

Albuquerque

Research and development will continue to further optimize the plutonium Molecular Laser Isotope Separation process at the Los Alamos National Laboratory. Subscale process experiments will be conducted in existing facilities to investigate advanced photophysics and chemical techniques. Efforts will also include research and development work to investigate advanced laser systems that show potential for process efficiency and cost benefits. There is a decrease in funding of $3,359,000 primarily for the Molecular Laser Isotope Separation program to reflect completion of laboratory scale test system construction.

Idaho

At Idaho, supporting services will be reduced by $942,000 from the FY 1986 level. Services provided in FY 1987 include conceptual engineering studies for general plant needs, engineering for capital equipment procurements, minor facility startup projects, and procurement of plant operating spare equipment. The decreased funding reflects the reduction in facility startup costs.

Oak Ridge

Of the increase in supporting services, an additional $4,007,000 is requested for the Oak Ridge operations.

The Oak Ridge Y-12 Plant will produce enriched lithium compounds, and the Fernald, Ohio, Feed Materials Production Center will produce depleted uranium metal for use in nuclear weapons in FY 1987.

At the Fernald, Ohio, Feed Materials Production Center, the FY 1987 request provides for operation of the facility to convert depleted and slightly enriched uranium from a hexafluoride (UF_6) to a tetrafluoride (UF_4) form.

At the Oak Ridge National Laboratory, decontamination activities will be performed in FY 1987 following the complete conversion of the uranium-233/uranium-235 solution to solid form. Feasibility studies and engineering studies are currently underway on the possible deactivation of uranium-233 processing facilities as a cost savings measure.

An additional $2,000,000 is included in the FY 1987 budget for rewinding of the motors at the Portsmouth Gaseous Diffusion Plant to increase production capacity by almost 60 percent. Also, $4,000,000 is being provided to assist in maintaining the Oak Ridge Gaseous Diffusion Plant in standby. These tasks are required for future uranium requirements which cannot be met under current conditions.

Richland

At Richland, requested funds will support continuation of the decontamination and decommissioning of the highly contaminated KE-Fuel Storage Basin, to minimize future surveillance and maintenance costs, and human exposure to radiation. Level of effort funding is provided to maintain and administer safeguards and security activities and upgrade projects, and to provide conceptual engineering support for general plant projects and construction projects. Also, inventories of spare parts for old and often obsolete reactor components will be maintained.

FY 1987 technical development funds at Richland include those costs associated with development of new and improved processes for fuel fabrication and irradiation activities. Funding provides for continuing investigation into end cap associated fuel failures and charge/discharge operations. These efforts should result in increased reactor operating time and production and reduced personnel radiation exposure.

Project support activities will be increased in FY 1987 by $4,410,000 for the Process Facility Modifications (PFM) Project (84-D-135). The project will provide cost-effective means for recovering plutonium from Fast Flux Test Facility (FFTF) fuel and for reducing N Reactor fuel processing costs by the mid-1990's. Plutonium recovered from FFTF fuels will be used for blending with high purity plutonium or processed further to meet requirements. Both uses will increase the availability of weapon-grade plutonium. The mechanical decladding of N-Reactor fuel in PFM will significantly reduce the volume of high-level wastes and thereby reduce waste management costs. The FY 1987 request for PFM project support increases by $4,410,000 to allow the completion of ongoing prototype equipment mock-up activities and to continue process verification and facility operability studies as well as technical reviews of design and construction activities.

Savannah River Plant

At the Savannah River Plant, funding will increase for supporting services by $13,258,000. Of the increase, approximately $4,460,000 is for security activities. The remainder is for process development, landlord functions, inventory replenishment, etc.

The FY 1987 funding for the Savannah River Plant provides operating expenses for common use stores and process spares inventories to support reactor operations. This includes support for recent additions in reactor equipment as a result of the restoration and upgrade programs to improve productivity. The Savannah River Laboratory will continue to perform technical development activities in support of site operations. Among these activities are development of robotics for improved efficiencies and safety and development of equipment and systems to extend the life of the Savannah River Plant reactors.

Chemical processing development is required at the Savannah River Plant to increase operability and maintainability of existing facilities and new facilities. In FY 1987, these activities include support to the canyon renovation projects, improved process controllers, and on-line analytical instrumentation. In addition, the development of improved environmental monitoring techniques, advanced computer modeling of environmental dispersion behavior of radionuclides, and safety analyses will be supported.

	FY 1986 Adjusted Appropriation	FY 1987 Request
D. Program Direction	$22,276	$22,900

The FY 1987 request for program direction provides for salaries, benefits, travel, and other associated support costs for 348 full-time equivalents--48 for DOE Headquarters and 300 for Savannah River Operations Office. The FY 1987 level is an increase of $624,000 from the FY 1986 amount which includes a planned reprogramming in FY 1986. The FY 1987 staffing level is an increase of 11 positions at Savannah River to support environmental, safety, security, productivity retention, and Defense Waste Processing Facility activities.

Savannah River Plant

The primary mission of the Savannah River Operations Office is the technical and contractual direction, management, and oversight of the below listed programs; with national defense programs comprising over 95 percent of the mission. The principal goal of the defense activities is to provide the necessary nuclear materials and weapons components for the Nation's defense programs, fuel material for the Naval Nuclear Propulsion Program, and for safe storage of nuclear waste byproducts.

- Nuclear Materials Production
- Weapons Activities
- Defense Waste and Transportation Management (Interim, High Level Waste Technology Development and Defense Waste Processing Facility)
- Naval Fuel Materials Facility
- Biological and Environmental Research
- Energy Conservation (Atlanta Support Office)
- Space Nuclear and Basic Energy Science

Employment at the Savannah River Plant for the above programs is currently about 15,300. The Savannah River Plant operates four nuclear production reactors. The reactors are supported by facilities for fuel and target fabrication, chemical processing and storage of radioactive waste. The Defense Waste Processing Facility, now under construction (scheduled for 1989 completion), will lead to solidification of high-level radioactive waste for permanent storage in a designated Federal repository. The Savannah River Operations Office provides the major support for conduct of Nuclear Materials Production activities; it receives greater than 40 percent of the annual Nuclear Materials Production program funding. The Nuclear Materials Production program is the largest program at the Savannah River site.

Salaries, benefits, travel, and other associated activities support the Savannah River Operations Office management and oversight of the above programs and are funded from Program Direction. Program Direction also provides support services for IG staff (5), General Accounting Office, Calculon and other support service contractors.

Headquarters

The Headquarters FY 1987 program direction request provides for salaries, benefits, travel, and supporting services for 48 full-time equivalents at the facility in Germantown, Maryland.

The Headquarters staff is responsible for direction, management, and overall support of the Nuclear Materials Production program. This includes such activities as the development of program goals, objectives, and plans consistent with Administration policy; formulation and justification of the proposed budgets and program initiatives to the Office of Management and Budget and the Congress; performance of management and technical reviews, safety evaluations and other studies, analyses, and evaluations to assure program accomplishments, to continually optimize technical, managerial and economic aspects of the programs, and to assure effective, efficient, safe, secure, and environmentally-acceptable program operation; and coordination of the program with other agency programs, other Federal agencies, the Office of Management and Budget, the Congress, the United Kingdom and other allies, field offices, and numerous contractors.

	FY 1986 Adjusted Appropriation	FY 1987 Request
E. Enriched Material	$169,600	$204,500

The FY 1987 request provides funding for separative work and other associated costs to provide enriched material for the Nuclear Materials Production and Naval Reactors programs.

A total of $190,000,000 is needed to supply uranium-235 to Naval Reactors in FY 1987. This request is $29,600,000 above the FY 1986 level. The highly enriched uranium will be used for fabrication of reactor cores used in shipboard and prototype naval reactor plants.

The request also includes $14,500,000 to provide slightly enriched uranium for the Richland N Reactor. This increase of $5,300,000 provides additional slightly enriched uranium to replace N Reactor recycle material that does not meet DOE specifications.

	FY 1986 Adjusted Appropriation	FY 1987 Request
II. Capital Equipment	$109,540	$126,090

Reactor and processing operations utilize large, unique, and expensive items of equipment. A significant portion of this equipment is approximately 30 years old. In the corrosive environment of fuel processing facilities, stainless steel or equivalent material resistant to corrosion must be used. Also, because of the high radiation levels in the processing facilities, equipment must be specially designed for remote in-place maintenance and removal. Nevertheless, the capital equipment request is less than 1 percent of the total investment in the nuclear material production facilities.

Equipment is repaired and maintained to assure a high level of operation. When replacement parts are no longer available for installed equipment, modern replacement equipment is procured, installed, and integrated into the remainder of the process systems, if possible. However, in many instances, old equipment must be repaired and irreplaceable parts must be fabricated on site, an expensive and inefficient alternative.

The FY 1987 request is $16,550,000 above the FY 1986 level. Of the increase, $5,605,000 is for escalation, and $10,945,000 is for programmatic activities.

A. Reactor Operations

Capital equipment funds will be used to support full operation of the production reactors at the Savannah River Plant and N Reactor at Richland. Oak Ridge funding supports the reactor feed plants at Fernald and Ashtabula, Ohio, and the Y-12 Plant at Oak Ridge, Tennessee.

Richland

The capital equipment funds for N Reactor will support reactor operations, fuel manufacturing and other activities including production support equipment ($1,000,000) for plutonium production; equipment for the Production Assurance process tube replacement activity ($4,600,000); an automated refueling system computer to control safety interlocks, operations sequence, and process tube alignment ($700,000); a fuel basin debris handling system ($825,000) to reduce radiation exposures; nondestructive examination equipment upgrades ($670,000); and Class VI computer support ($600,000) for increased activity of weapon-grade plutonium production consistent with long-range program objectives.

Savannah River Plant

Major new items of capital equipment needed for the Savannah River Plant reactor operations include two spare process water heat exchangers ($3,100,000) to minimize releases of tritium into the reactor effluents; replacement inspection equipment ($1,000,000) to assure that nonspecification slugs are rejected before reaching the reactors; a process monitor ($1,000,000) to monitor and control the slug manufacturing process; replacement of the emergency lighting ($800,000) at each reactor to meet safety and security criteria; and replacement of the neutron sources at each reactor ($1,000,000) to effectively implement nuclear safety criteria.

Oak Ridge

At the FMPC, Fernald, Ohio, budgeted items are essential to maintain the efficient operation of the facility. One major item ($4,400,000) is a new Transfermatic Machine in Plant 6 to replace the 20 year old, obsolete machine that is now in use. This machine, originally in the FY 1986 budget, was deferred to FY 1987 because of the urgent need to purchase HEPA filters (to be funded originally in FY 1987) to stop excess environmental releases of uranium that threatened the continued operation of the FMPC. Another major item ($4,190,000) will replace three old ingot lathes with two new ones. Existing lathes are badly worn and are a threat to worker health because of a lack of proper ventilation systems to remove hazardous vapors created during the cutting process. At the Ashtabula extrusion facility, a major item ($1,000,000) is needed to upgrade the extrusion press to meet current safety standards established by the American National Standards Institute.

B. Materials Processing

Increased capital equipment procurements are necessary to support the continued high capacity operations of the nuclear materials processing facilities.

Idaho

Equipment procurements planned in FY 1987 will provide replacements for equipment no longer suitable for continued use and will upgrade capabilities to meet future process requirements. Examples of equipment procurements planned for FY 1987 include: specialized dissolution and handling equipment to upgrade custom processing capabilities, upgrades of equipment and software for the FAST operating process simulator, expansion of the remote mockup system for equipment verification in the Fuels Processing Restoration project, and renovation and equipment upgrade of the radiochemical laboratories. Routine process equipment, e.g., pumps, valves, samplers, and electrical equipment, also will be procured to support process operations.

Richland

An increased level of capital equipment is required to support the operability of the PUREX fuel processing plant and the plutonium metal conversion facility. Replacement equipment includes dissolvers, extraction columns ($350,000), pumps, agitators, centrifugal contractors ($950,000), vessels and heating and ventilation items. The request includes $1,000,000 for shielded casks to transport fuel from the Fast Flux Test Facility to the Process Facility Modifications project for processing.

Savannah River Plant

Capital equipment needs to be increased to support continued high capacity operability of processing facilities. Replacement equipment must be maintained in inventory for rapid installation when an equipment failure occurs that interrupts operations. Replacement equipment items include centrifugal mixers and contactors, tanks, evaporators and product concentrators.

Other Sites

The Los Alamos National Laboratory request for capital equipment includes items to support recovery of plutonium from nonspecification and scrap materials including pumps, agitators, and instrumentation.

Special Isotope Separation

Capital equipment will be procured to support laboratory experiments on the Atomic Vapor Laser Isotope Separation process at Lawrence Livermore National Laboratory. Of the total capital equipment funding, $1,000,000 is for SIS.

C. Supporting Services

Savannah River Plant

Major new items of capital equipment needed for the Savannah River Plant support operations include an upgrade of the emergency diesel generators ($3,000,000) to provide backup electrical service; additional air compressors to replace the 30-year old compressors at each reactor ($1,500,000); replacement of the domestic, fire and service water pump turbines ($900,000) to improve reliability and reduce maintenance; installation of high volume constant air monitors ($3,000,000) to meet current safety regulations; a separations support facility to support development and testing of new equipment; an upgrade of the data communications between computer systems; and five CAD/CAM work stations to be fully compatible with computer systems initiated in FY 1984 ($1,290,000).

Oak Ridge

At the Oak Ridge Y-12 plant, capital equipment funds are needed to continue the upgrading of lithium processing equipment. Much of this equipment is very old and badly worn, requiring replacement if the lithium production output is expected to meet established goals.

Idaho

Equipment procurements planned in FY 1987 include: replacement of the obsolete electrical panels throughout the plant; an automated computer controlled drawing file; retrieval, printing and control system to accommodate the large volume of plant drawings; heating and ventilating equipment, including blowers, to replace obsolete equipment originally installed in the 1950's; and numerous lesser cost items of equipment including instruments, electrical test equipment, bar code readers, and computer terminals and printers.

Richland

Supporting equipment procurements are planned to provide containers to transport contaminated failed equipment to waste management facilities, calorimeters for measuring special nuclear materials and instrumentation to monitor materials.

Site General

Finally, capital equipment is procured to support plant-wide activities at all of the production sites. Such equipment is also required to provide for health, safety, environment, and safeguards concerns. Maintenance costs have become excessive and replacement is necessary to continue operations.

	FY 1986 Adjusted Appropriation	FY 1987 Request
III. Construction	$210,857	$343,666

The FY 1987 request for construction will provide for:

- General Plant Projects at all sites;
- Initiation of a project to reduce chemical discharges to the process sewers from the N Reactor fuel fabrication facility at Richland;
- Partial design on a radioactive liquid effluent treatment facility for the Richland N Reactor;
- A new project to prevent spills of hazardous and/or radioactive materials into ground or surface waters around the Savannah River Plant;
- Initiation of a project to reduce uranium discharges from the Fernald Feed Materials Production Center and ensure that plant operations do not pose a threat to the environment, the community, or the work force;
- Continuation of a Productivity Retention project essential to maintaining production capabilities at the Fernald Feed Materials Production Center and at the Savannah River and Richland production sites;
- Continuation of the installation of an in-core neutron monitoring system at Richland;
- Continuation of the upgrade of the electrical systems in the PUREX fuel processing plant at Hanford to replace deteriorated insulation on the wires, replace worn switch gear and separate emergency wires from the routine cable trays to improve operability and safety of the plant;
- Continuation of a project at the Savannah River Plant to upgrade the electrical distribution system for the production reactors;
- Continuation of the installation of an additional tritium furnace and containment system at the Savannah River Plant to ensure production capability and reduce tritium releases;
- Initiation of a project for thermal mitigation of the Savannah River Plant C and K Reactor cooling water discharges to meet National Pollution Discharge Elimination System permit requirements;
- Continuation of a new waste water storage and treatment facility for the F and H Separations Areas at the Savannah River Plant. Under the Resource Conservation and Recovery Act, this facility must be operational by November 1988;
- Continuation of construction projects at the Savannah River Plant, Idaho, and Richland to improve the security of key nuclear materials production facilities and materials;
- Continuation of a project to provide facilities to directly hydrofluorinate plutonium oxide to plutonium tetrafluoride for conversion to metal;
- Continuation of a project for restoration of the Idaho Fuel Processing Facility to assure support for the U.S. Navy nuclear program and recover valuable uranium for the Department's defense programs;
- Continuation of a project at the Fernald, Ohio, Feed Materials Production Center needed to assure continued safe and reliable operation and meet DOE commitments to improve conditions at the Fernald site;

- Continuation of Fuel Production Facility construction at the Savannah River Plant to eliminate the need for over-the-road shipments of uranyl nitrate solution to Oak Ridge and to allow for conversion to more efficient powder metallurgy fabrication techniques;
- Continuation of design and minimum construction activities necessary for the expansion and modification to existing fuel processing facilities at Richland;
- Continuation, on a stretched-out schedule, of modifications to the existing DOE-owned fuel processing facilities at Richland for improved head-end fuel dissolution to provide the capability for processing and recovering plutonium from DOE-owned fuels not currently amenable to processing in the United States and for improved processing of N Reactor fuels;
- Continuation of a project at the Oak Ridge Y-12 plant to renovate an existing highly enriched uranium conversion facility;
- Continued facility restoration efforts at the Savannah River Plant to return critical production facilities to a condition adequate to meet mission requirements;

Detailed information on individual construction projects is included in the Construction Project Data Sheets.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET SUBMISSION
CONSTRUCTION PROJECTS OVERVIEW
MATERIALS PRODUCTION

Project Number	Project Title	TEC a/	FY 1986 Adjusted Approp.	FY 1987 Request
87-D-146	General Plant Projects, VL	$ 35,980	$ 31,945	$ 35,980
87-D-149	Reduced Chemical Discharges to Process Sewers, RL	3,150	0	3,150
87-D-150	Radioactive Liquid Effluent Treatment Facility, Partial Design Only, RL	4,000	0	4,000
87-D-152	Environmental Protection Plantwide, SR	6,500	0	1,500
87-D-156	Reactor Effluent Cooling Water Thermal Mitigation, SR	109,000	0	5,000
87-D-159	Environmental, Health, and Safety Improvements Phase I, FMPC, OR	60,000	0	10,000
86-D-148	Special Isotope Separation Project, VL	3,805	3,805	0
86-D-149	Productivity Retention Program, Phase I and II, VL	282,100	19,600	76,225
86-D-150	In-core Neutron Monitoring System, N Reactor, RL	7,550	5,130	2,090
86-D-151	PUREX Electrical System Upgrade, RL	8,300	2,380	3,900
86-D-152	Reactor Electrical Distribution System, SR	21,000	2,710	7,700
86-D-153	Additional Line III Tritium Furnace, SR	16,000	1,805	7,300
86-D-154	Effluent Treatment Facility, SR	50,000	2,500	15,650
86-D-156	Plantwide Safeguard Systems, SR	50,000	2,710	13,900
86-D-157	Hydrofluorination System, FB-Line, SR	9,200	2,000	2,510
85-D-137	Vault Safety SNM Inventory System, RL	4,400	1,900	0
85-D-139	Fuel Processing Restoration, IFPF, ID	270,000	13,530	35,000
85-D-140	Productivity and Radiological Improvements, FMPC, OR	47,000	15,000	23,500
85-D-145	Fuel Production Facility, SR	85,000	18,000	35,500
84-D-134	Safeguards and Security Improvements, Plantwide, SR	52,500	6,315	14,650
84-D-135	Process Facility Modifications, RL	240,000	14,475	35,000
84-D-136	Enriched Uranium Conversion Facility Modifications, Y-12 Plant, OR	20,600	12,200	3,000
84-D-137	Facility Security Systems, Upgrade, IFPF, ID	10,000	4,700	300
83-D-148	Non-Radioactive Hazardous Waste Management, SR	22,100	7,760	0
82-D-124	Restoration of Production Capabilities, Phase II, III, IV, & V, VL	367,250	39,600	7,811
82-D-126	Reactor Safety and Reliability, VL	40,600	1,800	0
82-D-201	Special Plutonium Recovery Facilities, JB-Line, SR	83,800	4,400	0
82-D-136	Fuel Processing Facilities Upgrade, IFPF, ID b/	46,000	0	0
-	Reductions from Prior Year Unobligated Construction Projects	-	-3,408	0
			$210,857	$343,666

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a/ Excludes PE&D funds

b/ Project scope change only.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

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3. Date A-E work initiated: 1st Qtr. FY 1987

5. Previous cost estimate: None

3a. Date physical construction starts: 1st Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1990

6. Current cost estimate: $35,980
Date: 1/86

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7. Financial Schedule (Prior year projects shown for comparative purposes)

Fiscal Year	Obligations	Costs FY 1987	Costs After FY 1987
Prior Year Projects	$ xxx	$18,090	$43,708
FY 1987 Projects	35,980	7,190	28,790

8. Brief Physical Description of Project

This project provides for various items of new construction, additions, alterations, and retirements to the land, buildings and utility systems at Savannah River, Richland, Idaho, Oak Ridge, and Albuquerque to support program needs in the areas of health, safety, environment, safeguards, general support, materials production program needs, and other program requirements of the department.

Savannah River	$ 16,180
Richland	8,700
Oak Ridge	6,000
Idaho	4,200
Albuquerque	900
Total Materials Production Program	$ 35,980

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*Some improvements may be located on non-government owned land

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project

Although it is difficult to provide a detailed description of this type of project in advance, listed below are examples of subprojects under consideration. In general, the estimated cost given for each of the listed subprojects is preliminary in nature and primarily indicative of the size of the project. It should be noted also that the continuing study of requirements will result in some of the projects being changed in scope or postponed, or other projects being added, all depending on conditions or situations not apparent at this time. The total estimated cost of a project may not exceed $1,200,000 including the cost of installed equipment when it is an integral part of the project.

Savannah River $16,180

Minor Projects, each $75,000 or less .... $ 3,040

A continuing need exists for capital improvements, each costing $75,000 or less, to general plant facilities to assure continued safe operation of plant structures and utilities. An estimate of $75,000 is included in this project for the Savannah River Ecology Laboratory (SREL) to fund minor modifications and improvement of existing facilities.

Instrument Air Improvements, 190, 183-4 & 184 PKC Reactor Areas.................. $ 900

Provide the following items:

1. State of art instrument air dryers capable of supplying instrument air at -40°F.
2. Continuous on line dew point monitoring with alarm panel indicators.
3. Replace fouled instrument air supply piping and impulse lines at 184-K
4. Convert air compressor cooling water supply to domestic water.
5. Replace 7" x 7" compressor heads with 8" x 7" compressor heads.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

Justification:

1. New powerhouse and water plant instruments require high quality, reliable instrument air. Existing instrument air dryers are steam heated. Parts unavailability often results in prohibitively high downtime.
2. Continuous dew point monitoring will provide better surveillance of instrument air quality.
3. The operating contractor has advised that the instrument air lines at 184-K are questionable quality due to possible oil, water, and grit fouling.
4. Heat exchanger fouling problems would be greatly reduced.
5. Increased capacity and easily available repair parts would result.

Failure to perform this work could result in unscheduled down time due to instrument air failure. The inability to provide quality instrument air could result in inaccurate instrument readings due to fouled instruments.

D-Wing Clean Laboratory Renovation, 735-A .... $ 300

Reclaim a portion of D-Wing, 735-A basement and install a 900 sq. ft. modular laboratory enclosure, with completely controlled environment, a fire suppression system, and several hoods. The modular enclosure will be a Class 10,000 "clean room" to provide radioactivity contamination-free, instrumental operating space. Services such as chilled water, steam, process hot and cold water, 90# air gases and drain will be made available. The present Ultralow Level Instrumental Analysis Facilities are used to capacity and cannot accommodate the sample analysis workload and necessary analytical equipment that are required to support studies requested in support of Special Programs and environmental monitoring. These programs require the ultimate in low radiation background and an absolutely radionuclide, contamination-free environment. The renovated facilities will house a $500,000 yearly programmatic effort to conduct interpretive studies on data obtained from highly sensitive measurements on 4000 samples per year.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

Mass Spectrometry Facility Expansion, 735-A .... $ 350

Add a 1500 square feet expansion to the east (plant) of the existing Mass Spectrometry Facility. The expansion will consist of a 1000 square feet spectrometer module meeting Class 1000 clean room specifications; a 250 square feet filament preparation lab module meeting Class 100 clean room specifications; a 150 square feet filament loading lab module meeting Class 100 clean room specifications and directly connected to the filament preparation module; and a 100 square feet storage room for supplies and spare equipment. The existing 900 square feet Mass Spectrometry Facility is not large enough to accommodate the planned acquisition of a general purpose low-lev mass spectrometer (FY 86). That acquisition is necessitated by an increasing sample load which currently preventing efficient use of an existing, highly specialized three-stage mass spectrometer, the existing facility also contains a static gas mass spectrometer and analytica laser instrumentation.

Entry Control, 703-46A .... $ 995

This building will house visitor control, lobby, plantwide access computer center, SRP and DOE Security Personnel, Public Affairs, DOE Public Reading Room and guard entry to 700 Administrative Area. Four trailers could be released upon completion of this building.

Additional Fence and Street Lighting, 300-M .... $ 300

Additional security lighting will be provided within the 300-M protected area and 321-M exclusion areas as necessary to eliminate potential areas of adversary concealment around operating facilities. Adequate lighting is necessary for security inspector assessment of these areas and meet the requirements of DOE Order 5632.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

Additional Honeycomb Storage, 321-M .... $ 500

Additional borated concrete honeycomb storage will be installed in Building 321-M, to increase the existing number of positions, 1780, by 1000.

The existing storage is insufficient to permit efficient interim storage of fuel and target tubes at present production rates, which are approximately twice those of two years ago. It is at times necessary to halt extrusion operations due to lack of storage. The additional storage will reduce radiation exposure and enhance operating efficiency.

SWE Shop and Changeroom, 211-F .... $ 995

Provide change rooms and non-regulated shop space in the 211-F area. The F-Area outside facilities need change rooms for personnel to enter the regulated portions of 211-F. The existing male change rooms are obsolete and located remotely from the area requiring employees to travel through clean areas in regulated clothing. No permanent female change room is located in the area. Shop space is needed to support major installations of electronic equipment currently authorized.

Replace Deepwell, 905-71G .... $ 500

Provide a new deepwell and pump of similar capacity as that of 905-71G.

The relocation of construction personnel from TC-1 to Central Shops will increase demands on the central shops domestic water system. Failure to replace this well could result in limited water supplies and inadequate fire protection water.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations   2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

Replace Deepwell, 905-13G .... $ 500

Replace existing deepwell with one of similar size and capacity. This is a domestic well servicing TNX.

The average life of a deepwell on plant is approximately 28 years. Beyond this, the well casing begins to deteriorate causing a reduction in well capacity flow rate. This well has exceeded its useful service life and is operating at reduced capacity, demonstrating its need for replacement.

Waste Compactor and Building, 321-M .... $ 400

A building will be constructed adjacent to Building 321-M and a compactor will be installed to reduce the volume of contaminated waste. Project will enable more efficient use of Burial Ground space.

Records Management, 773-51A .... $ 995

Consolidates Records Management functions presently located in basements of 703-A and 773-A. Consolidates permanent records storage presently in non-DOE standard locations across the plantsite. House plant central mail room and provide visitor/conference center for SRL. Five trailers could be released upon completion of this building.

Replace Low Voltage Power Cables, 483-D .... $ 900

Replace underground low voltage AC and DC power cables, control cables, and conduit in the Water Treatment Plant, 483-D.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

These cables have been in service for 31 years. Some of the original cables have failed and were replaced by the operating contractor Department in recent years in order to maintain plant operation. Future demands on the 400 Area power facilities (i.e. D-F and D-TNX Steam Lines) has increased the reliability requirements of the Powerhouse. Replacement of these cables is necessary to meet these requirements.

Canyon Office Building, 200-F .... $ 500

Provides office space for 200-F Canyon personnel. Increased computer process operation will occupy present office facilities.

Equipment Storage Facility, 711-G .... $ 750

Design and construct a permanent building to provide storage space for portable equipment. The present storage facility, building 710-G, provides approximately 60% of the equipment storage space currently required. Due to the lack of sufficient storage space, equipment must be stored unprotected from the environment. This causes unnecessary premature deterioration of equipment. In addition, 710-G was constructed 30 years ago as a temporary structure and is in need of replacement.

Upgrade Lower 700-A and SRL Area Lighting .... $ 820

Provide additional fence and street lighting in the lower 700 area and SRL to meet DOE security specifications and Du Pont Standards for safe general area and roadway illumination.

Provide Permanent Coal Handler's Building and Office Complex, 484-D .... $ 350

Provide a permanent building to replace the temporary coal handling trailer in 400-Area. The new facilities must include an office, lunch room, bath rooms, showers and lockers for men and women. The new facilities must be large enough to satisfy the needs of 14 employees.

The existing trailer has deteriorated and is in extremely poor condition. It is not large enough to satisfy employee needs. No women's facilities are provided.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations   2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

13.8 Static Wire (C-Area to Central Shops) .... $ 300

Install a static wire for the existing 13.8 kV line from 100-C to Central Shops.

The line is vulnerable to power outages caused by lightning. Lightning causes O.C.B. 15-C to relay out due to action of the overcurrent relay.

SREL Library .... $ 800

The SREL technical staff has expanded by almost 50 since moving into the building in 1977. Because of the increase in staff and additional projects, more technical documents are needed in the library. SREL has utilized all available space and are not able to expand to handle the vast numbers of documents needed for laboratory operation.

Others

Welding Facilities, 105-KC	$ 200
Extend Parking Lot, 100-P	$ 100
Improvements (FY 87) to WSI Facilities, TC-1	$ 150
Meteorological Engineering Lab Expansion, 735-7A	$ 200
Human Factors Engineering Laboratory, 773-A	$ 100
Meteorological Weather Center Renovation, 773-A	$ 200
Service Floor Restrooms, 773-A	$ 150
Expand Restroom Facilities, 679-T	$ 100
Upstairs Restroom, 320-M	$ 100
Storage Building, 300-M	$ 150
Install Aluminum Stock Storage Pad, 315-M	$ 150
Coal Pile Drainage Improvements, 484-D	$ 110

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations   2. Project No. [illegible]

9. Purpose, justification of need for, and scope of project (Cont'd.)

Boat Dock on L-Lake (SREL)..$ 100

Heating & Air Conditioning System, 760-G....................................$ 175

Richland.. [illegible]

Capital Work Orders .... $ [illegible]

These are miscellaneous jobs of capital nature which are necessary to maintain continuity of operation, protection of the environment, and to provide safeguards for the protection of life and property. Such work would include additions, improvements, and replacement of structures, building services, utilities, and associated equipment.

RMC Ventilation Improvement .... $ 700

This project will improve the control over potential radioactive contamination at the Remote Mechanical-C Metal Line in the Plutonium Finishing Plant by replacing existing filter boxes 10, 20, and 22 with bag-in/bag-out filter boxes.

Q Cell Glovebox .... $ [illegible]

This project will install a new glovebox in the Q Cell Loadout Room at PUREX Plant. The glovebox will receive neptunium nitrate from PUREX processing and will be equipped both for conversion of the nitrate to neptunium oxide and for loading out the oxide for future shipments away from PUREX.

PRF Filter Box Improvement .... $ [illegible]

This project will replace the filter box on the fifth floor of the 236-Z Building with a new filter box having bag-in/bag-out features and a demister. The new equipment will improve controls over radioactive materials and eliminate the humidity problems now associated with the first stage filter boxes at the Plutonium Reclamation Facility.

PFP Ventilation Air Supply Improvement .... $
300

This project will install new dampers in the ventilation air supply ducts at the Plutonium Finishing Plant.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

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9. Purpose, justification of need for, and scope of project (Cont'd.)

KE/KW Tie-Ins to Alarm Monitoring System .... $ 380

This subproject allows site security forces to respond in the most timely fashion possible to alarms originating in the areas where spent fuel is stored before transport. The user requirements the contractor has imposed are satisfied by incorporation of these alarms and the most effective alarm monitoring is provided.

1314-N Loadout Facility Upgrade .... $ 475

This subproject provides for double containment of chemical waste in interim storage, and for monitoring and leak detection systems for the interim storage facilities. Personnel working in the Loadout Facility will be protected against potentially hazardous exposure to the waste by physical safeguards. Possible environmental contamination will be reduced.

Transfer Area Upgrades .... $ 950

Installation of a transfer area airlock will eliminate the potential for the spread of airborne contaminants from a radiation zone by placing physical barriers between the radiation zone and surrounding environment. Installation of a concrete pad in the fuel transfer area will aid in cleanup of any contaminants released to the ground during railcar decontamination, and construction of a wall will prevent the potential releases of airborne contaminants from the transfer area. Addition of a shelter will enhance worker efficiency and provide more usable work space.

RWS-7/RW Hanger Replacement to Seismic Conditions .... $ 800

This project will assure emergency core cooling and limitation of fuel failure by the Graphite Shield Cooling System during a seismic accident in which no direct fuel cooling is available. The raw water supply system to the Graphite Shield Cooling System cannot now withstand seismic forces postulated for such an accident. Should such an accident occur, water may not be supplied to the system increasing the potential for core meltdown.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

Fuel Production Storage Building... $ 210

New canisters, lids, loading tongs, pallets a forklift, and other equipment used in the transfer of fuel to the reactor are now stored in the open air. Weatherization and soil affect their operation and make periodic repair/refurbishment necessary. This project will eliminate the adverse effects of open air storage by providing a building to house the equipment.

Basin Debris Handling System .... $ 950

Use of an approved system for removal and containment of debris in the fuel storage basin will expedite collection of debris, increase the space available for fuel rod storage, and eliminate interference in canister placement now caused by the presence of debris.

T-Plant Ventilation System Upgrade $900

This project will upgrade the heating, ventilating and air conditioning system at the 221-T Building, 200 West Area, to allow continued long-term (20 year) use of the equipment decontamination facilities to support 200 Area operating plants.

HPV 107 & 108 Valve Replacement $295

The existing HPV 107 and 108 pressure reducing valves now leak so much in the closed position that the large steam boiler cannot be kept in the hot standby mode of operation without use of other valves for added control. Such inefficient valve operation adversely affects diesel fuel consumption and boiler efficiency. New efficient valves and an updated control system will assure optimal fuel use and boiler operation.

Oak Ridge.. $ 6,000

Miscellaneous Items - Plant-wide, Feed Materials Production Center (FMPC) . $790

Based on experience in prior years and anticipated future requirements, this estimated amount is required for minor construction jobs related to buildings, roads, and utilities. Included are improvements to air conditioning systems, test and replacement of electric power feeder cable, and replacement of underground water and power lines.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

UF_6 Cylinder Storage Area Pilot Plant, FMPC $175

The UF_6 cylinder storage area south of the pilot plant is to be enclosed. The building will measure approximately 50 ft. x 105 ft. x 32 ft. tall.

This project is needed to insure that an adequate supply of UF_6 cylinders are available for vaporization in the autoclave area. This facility would also allow cylinders to be weighed upon receipt without additional handling by the relocation of the UF_6 scale to the receiving area.

Pilot Plant Green Salt Storage, FMPC $100

The shelter area on the northeast corner of the Pilot Plant is to be enclosed to provide short-term storage of green salt product. The shelter area is approximately 2,700 square feet.

This project is needed to provide a closed indoor storage area for greensalt which will afford protection from the weather while the product is awaiting transfer to a larger storage area.

North Side Access Road & Parking Lot, FMPC $400

A construction road from the north access road to the north gate and a construction worker parking lot are to be constructed at the north side of the outer fence.

This project is needed to handle the large quantity of construction workers and construction traffic to be on site during the FMPC Productivity Retention projects. The existing main gate access facilities will not be able to handle both the production and construction activities during this period.

Refurbish Health & Safety Building, FMPC $500

It is planned to refurbish the Health & Safety Building to coincide with the current guidelines for lighting, ventilation, energy efficiency, and space utilization.

This project is needed to provide adequate facilities for the increased Health & Safety staffs required by the more stringent regulatory requirements. The (infirmary) Medical Department requires major upgrading to bring it into line with today's standards. Additional requirements for Industrial Hygiene monitoring techniques must be efficiently implemented.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations   2. Project No. 87-D-146

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9. Purpose, justification of need for, and scope of project (Cont'd.)

Upgrade Lighting - Plant-wide, FMPC $500

Lighting of inadequate intensity is to be replaced with new fixtures meeting current standards and work station requirements. Inadequate lighting is a serious problem for both worker safety and job task quality. In addition, some fixtures have corroded and require replacement.

Controlled Storage Pad - Plant 8, FMPC $200

A controlled storage pad is to be constructed on the west end of Plant 8.

The existing pad is deteriorated and was not constructed according to current controlled storage guidelines.

Refurbish Ash System - Boiler Plant, FMPC $420

The ash removal system is to be upgraded from boilers 1, 3, and 4 to the ash silo, included are lines, fittings, wash, and primary and secondary systems.

The ash control system at the ash silo is also to be upgraded for loading of the ash for transportation and disposal.

This project is needed to restore the ash system to a high degree of reliability. The existing system is a source of frequent maintenance and must be replaced to mitigate any potential major failure.

Boiler Plant - Electrical Upgrade, FMPC.....................................$330

The boiler plant electrical equipment is planned to be upgraded. This work consists of replacing the main electrical feeders, worn switchgear, area lighting, and enclosing the substation.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations   2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

This project is needed to replace worn or deteriorated equipment to provide a high degree of reliability. The lighting is inadequate, and the substation must be enclosed to meet current codes.

Upgrade Steam System - Plant-wide, FMPC $950

The steam distribution and condensate return system are to be upgraded. The distribution piping is in relatively good shape; however, the isolation valves, pressure reducing stations, condensate receivers, and pumps are to be replaced.

This project is needed to insure adequate control of steam pressure, reduce steam loss due to leaks, and reduce the high maintenance requirements currently encountered.

Upgrade Electrical Distribution - Utilities, FMPC $760

The electrical distribution system is to be upgraded. The work includes replacement of electric feeders at the main substation, repair of the structures at the main substation, and upgrade of the manholes for improved safety of maintenance personnel.

This project is needed to provide reliable electric power to the plant. In addition, the safety of personnel is of prime importance.

Visitors Issue Center/Training Center, FMPC................................. $375

Provide a building between the northeast corner of First Street and the Service Building to provide control of visitor egress and ingress in terms of clothing cleanups. The building will contain clothing, safety glasses, goggles, lockers, sinks, and toilet facilities. Turnstiles will be sued to ensure a correct separation of clean side and process side of the building.

Health and Safety Training Facility, FMPC $250

Provide a training facility for use primarily by the Health and Safety Division. Purpose of this facility is to prepare and give training programs on all health protection subjects. The building will include a large room for about fifty people and will contain standard audiovisual aids, such as projectors, videotape players, TV monitors, and blackboards.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

Lighting Modification, FMPC $150

Provide lighting of adequate intensity and replace with new fixtures meeting current work standards and work station requirements. Adequate lighting will improve worker safety and job task quality.

Miscellaneous Items, Reactive Metals, Inc. $100

Based on experience in prior years and anticipated future requirements, this estimated amount for minor construction jobs is related to roads, utilities, and buildings.

Idaho.. $4,200

Dry Storage for Miscellaneous Fuels $850

It is current DOE-ID policy that operating fuel storage areas not be used to store nonprocessable fuel for longer than five years. After that period, the fuel shall be stored in retrievable dry storage until final disposition is identified. At present there are a number of special spent fuels stored in water at the Fuel Receiving and Storage building that have been in storage underwater for longer than five years. These fuels have not been processed to date because either (1) no process has been developed to recover the uranium they contain or (2) the uranium content is so small that is is not economically feasible to process them in existing facilities. To comply with DOE policy, these special fuels will be moved to a dry storage configuration. There are approximately 125 kgs of U-235 contained in about 100 cans and 1,100 elements. Current plans are to stop use of pool storage in the Fuel Receiving and Storage Building by no later than the end of FY 1990. To ensure that this date can be met requires an FY-1987 project for underground vaults to store these nonprocessable fuels. Continued storage of these fuels underwater would increase the potential for release of fission products and resulting contamination. A lifting fixture will be provided for retrieving the storage canisters and geometry controls will be used to ensure criticality safety. Vault shielding will be provided to minimize radiation exposure.

Power Burst Facility (PBF) Dry Fuel Storage $650

ICPP has been designated as the storage site for the Power Burst Facility (PBF) irradiated fuel rods. Sixty cans of fuel will have to be stored. These rods are classified as nonprocessable at ICPP; therefore, dry retrievable storage must be provided. The storage facilities must provide for

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. [illegible]

9. Purpose, justification of need for, and scope of project (Cont'd.)

security and surveillance requirements. This project will construct dry underground fuel storage vaults. A lifting fixture will be provided for retrieving the storage canisters and geometry controls will be used to ensure criticality safety. Vault shielding will be provided to minimize radiation exposure.

Radiochemistry Counting Facility $300

The Radiochemistry Counting Laboratory, located adjacent to spectrochemistry and analytical laboratories, analyzes samples collected from ICPP Process Streams. The reliability of the data collected by the radiochemical instrumentation is being adversely affected by existing low level background and transient radiation fields. In addition, the allowable floor loading in the laboratory prevents the optimum arrangement of the lead shielded counting caves resulting in less precise counting data, particularly on the low level samples. This project will provide for a new facility outside the normal laboratory space that will alleviate the problems with background and transient radiation fields. The results will be improved reliability of radiochemical counting data and increased sample throughput.

Vessel Off Gas (VOG) System for Pilot Plants $500

The plant VOG system does not supply adequate vacuum to maintain the pilot plants located in the CPP Process Technology Building, and the CPP High Bay Laboratory Building at negative pressure. As a result, NOx and other noxious gas as well as radioactive gases can potentially enter the pilot plant operating areas resulting in the need to shut down the applicable pilot plant areas on an emergency basis. All pilot plants in an area would be affected by such incidents resulting in lost time. Such delays could hinder ICPP from meeting process development and process verification milestones that support plant processing goals. This project will consist of installation of a mechanical blower system to boost the vacuum in the plant VOG system thereby alleviating this problem.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

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9. Purpose, justification of need for, and scope of project (Cont'd.)

Ash Street Utilities Extension $400

Utilities (water, air, steam, service waste) are not presently available for the future projects on the east side of ICPP. This project will provide for the extension of these utilities inside a utility tunnel to provide for the future needs of ICPP, such as the Fuel Processing Restoration (FPR) Project, Guard House, Immobilization Facility, etc.

ICPP Roads and Paving $930

Due to ongoing projects and normal wear, the need arises to improve existing roads and to construct new road sections connecting facilities to existing roads. This project will include widening and paving of the north patrol road, paving the new access road between NWCF and the new office building, and paving the new parking area for the procurement warehouse complex; it will also provide chipping and sealing of the existing bus parking lot.

Transfer Line from F-Cell to NWCF $600

Radioactive solids are removed from Aluminum and Stainless Steel dissolver products by the F-cell centrifuge system. The solids are transferred to the Process Equipment Waste System (PEW) where they have caused excessively high radioactivity concentration in the PEW evaporator overheads. This results in recycle of the evaporator overheads and accumulation of PEW evaporator feed. Shutdown of the dissolution processes is necessary whenever PEW evaporator feed surge capacity is exceeded. Isolation of a CPP Process Building waste tank to receive only F-cell solids waste is not possible with existing piping. In addition, if the solids could be directed to a single CPP Processing Building waste tank, there is still no way to transfer the solids to the waste system tank where there is some capability of mixing the solids (e.g. NWCF).

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

Present standards for radioactivity releases to the environment make future operation of the Stainless Steel process impractical. If the standards are tightened further, operation of the aluminum process may also be restricted.

IMPACT: The Stainless Steel dissolution process must be operated in FY-88 without the F-cell centrifuge system. This will result in extraction column plugging, poor product quality, a severe decontamination problem after the campaign, and a considerable increase in liquid waste sent directly to the tank farm.

Computer Communications Network Mods $300

Any terminal or personal computer will have access to any host computer at the ICPP or EG&G computer center that is on the network.

Currently each computer terminal connected to the HP 3000 requires two pair of telephone lines. The network will allow all terminals to be connected to the host computers using a single, common coax cable. This will free up existing telephone lines and eliminate future requirements for additional telephone lines for data terminals.

Relocation of computer equipment (computers, terminals, printer) would no longer be considered a major endeavor. There are no extra costs for connecting communications devices to the host or terminals, the single coax wire will be accessible in any building.

Currently distance from the host computer is the limiting factor in data transmission speed. For example, a terminal in the Spent Fuel Storage Building runs at 2400 baud (bits per second); this

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations   2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

equates to a 4 second time span to paint the CRT screen. The network will allow a device to communicate at a speed of up to 19,200 baud.

IMPACT: More telephone lines will be required for access to the host computers as more terminals and personal computers are purchased. However the number of lines available is limited and it is not cost effective to install more telephone lines.

There will be an ongoing expense of reconnecting computer terminals each time a person is relocated. This problem is compounded by the above item.

Access to more than one host computer is severely limited. Many terminal users have a need to access more than one host computer. Each connection to a different computer requires a separate set of telephone lines. Costs to install more telephone lines will increase.

Miscellaneous Minor GPP's $100

Each year small miscellaneous, but very important, minor GPP's are identified during the fiscal year. These are projects which require immediate attention. With all GPP funds previously committed, there are no funds remaining for such projects. This project will make funds available for implementing these small GPP's. The funding limit for each project is $25,000. Individual descriptions for these projects will be written as they are identified. Typical examples of minor GPP's are: evacuation alarms, fire alarms, process cell hatches, ceiling replacements, waste line installations, and small storage facilities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 87-D-146

9. Purpose, justification of need for, and scope of project (Cont'd.)

Albuquerque..		$ 900
Laboratory Space, Plutonium Facility	$900	

This project would support plutonium scrap processing, molecular fluorination technology exchange, and the development and demonstration of improved plutonium process technology. A key aspect of these NMP Program activities is the requirement for adequate "cold" laboratory space in the plutonium facility. This required "cold" laboratory space is essential for the assembly, testing, and demonstration of gloveboxes, robotics, and other plutonium processing equipment prior to its insertion into the hot facility.

10. Details of cost estimate

It is not possible to provide a detailed cost estimate for this project. Cost estimates for general plant projects are normally included in the request for a construction directive after the need for the work has been established, the scope of the job determined, and the preliminary engineering completed.

11. Method of performance

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procuremen will be by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

Not required.

13. Narrative Explanation of Toal Project Funding and Other Related Funding Requirements
Not required.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Nuclear Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Reduced chemical discharges to process sewers
Richland, Washington

2. Project No. 87-D-149

3. Date A-E work initiated: 4th Qtr FY 1986 (PE&D)

3a. Date physical construction starts: 3rd Qtr FY 1987

4. Date construction ends: 2nd Qtr FY 1988

5. Previous cost estimate: None

6. Current cost estimate: $3,500
Less amount for PE&D $ 350
Net cost estimate: $3,150
Date: 4/85

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$3,150	$3,150	$3,150	$1,400
1988	0	0	0	1,750

8. Brief Physical Description of Project

The proposed project will provide engineered systems and facilities that will isolate chemical releases from the fuels processing building, tank farms, and pipe trench from the process sewers and will direct spills from these sources to a facility for treatment and subsequent disposal. The completion of this project will result in significantly reduced discharges of chemical wastes to the fuels manufacturing facility process sewers. The present process sewer system carries process discharge from the fuels manufacturing area to the Richland 300 Area process sewer system which flows into a 1000-ft ground disposal trench. At present, an acid or caustic chemical spill can be neutralized in place, but no means is now provided to recover or dispose of organic solvents discharged to the process sewers. Perchloroethylene and 1,1,1-trichloroethane are of particular concern because they are extremely hazardous in minute concentrations and they cannot be neutralized once discharged to the environment.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Reduced chemical discharges to process sewers Richland, Washington		2. Project No. 87-D-149

8. Brief Physical Description of Project (Cont'd)

As it is now planned, the system will provide collection sumps, pumps, pipes, and holding tanks necessary to contain, transfer, and hold chemical spills prior to their treatment and disposal. Detectors in the pipe trench will be provided to detect spills. The chemical waste in the holding tanks will be removed, treated, or disposed of as required without allowing the waste to enter the ground, the process sewers, or the nearby river.

This project will provide a mixed ion exchange treatment facility where hazardous materials will be removed from waste streams. The ion exchange will remove heavy metals (such as lead and chromium) and radioactive materials (such as uranium and technetium). An activated carbon bed package will be provided to absorb the hydrocarbons (oil, grease, and perchoroethylene) that are present in the organic waste stream. The treatment facility will also be of adequate size to treat nitric acid scrubber water, solutions from chemical rinse tanks, and nitrate-nitrite salt removal tank process streams. Existing and new process tanks and equipment will be equipped with enclosures, electric power, alarms, drains, and instrumentation as required. All tanks, equipment, and facilities will be provided heating and ventilation for freeze protection, as required.

Retention dikes will be provided for the following:

Number	Size in Gallons	Major Contents
2	10,000	NaOH, 63950 lb
2	6,000	HNO_3, 38500 lb
1	6,000	H_2SO_4, 85140 lb
2	2,000	Waste acid (HF, 360 lb; HNO_3, 7200 lb; cupric nitrate, 7850 lb; uranyl nitrate)
1	1,800	U bearing (HNO_3, 2700 lb; H_2SO_4, 9200 lb; uranyl nitrate, 3000 lb)
1	1,500	Neutralizer (NaOH, $NaNO_3$, CuO)
1	900	Chemical mill (HNO_3, H_2SO_4, uranyl nitrate)
1	660	Filter press feed (NaNOs, Na_2SO_4, NaOH, sodium diuranate)
1	580	Copper strip (HNO_3, cupric nitrate, uranyl nitrate)
2	560	Filter press effluent ($NaNO_3$, $NaSO_4$, NaOH, sodium diuranate)
4	470	Zr etch (HF, HNO_3)
2	450	U bearing (HNO_3, H_2SO_4, uranyl nitrate)

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Reduce chemical discharges to process sewers Richland, Washington	2. Project No. 87-D-[illegible]

4. Brief Physical Description of Project (Cont'd)

FY 1987 funds will be used for the completion of definitive design activities, procurement, and construction. Design will be initiated in FY 1986 through use of FY 1986 Plant Engineering and Design funds totalling $350,000.

5. Purpose, Justification of Need for, and Scope of Project

Segregation of salt bearing and organic sewer streams will reduce the quantity of hazardous chemicals released to the environment. The present chemical processing areas, sites (trenches) and most of the bulk chemical tanks have no spill prevention or retention provisions. Any chemical leaks or overflows discharge directly into the process sewer and trench system that enters the local water table and the nearby river via riverbank springs. Large quantities of acid entering the process sewer could lower the pH and solubilize the heavy metal precipitates (U, Cu, Cr, Ni, etc.) in the trench thereby causing the transport of these heavy metals into the river. Of particular concern is the accidental discharge of degreasing solvents (perchloroethylene and 1,1,1-trichloroethane) and oils into the process sewer system. These solvents and oils have only low discharge limits and cannot be easily detected by monitoring devices.

Existing processing and storage tank capacities range from 100 gallons to 10,000 gallons and contain one or more of the following chemicals: nitric acid, sulfuric acid, hydrofluoric acid, sodium hydroxide, uranyl nitrate, cupric nitrate, perchloroethylene, and trichloroethane.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Reduced chemical discharges to process sewers Richland, Washington

2. Project No. 87-D-145

5. Purpose, Justification of Need for, and Scope of Project (Continued)

Environmental releases of reportable quantities of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) designated hazardous chemicals must be promptly reported to the National Response Center. Based upon past history (with no significant improvements in spill control), the operating contractor could experience two or three spills per year that must be reported according to CERCLA. As stated in CERCLA, any waste generator responsible for such environmental releases is held responsible for clean up of the environment affected and may also be held liable for any damages.

Environmental regulations from other agencies are becoming more stringent. The State of Washington is becoming more active in regulating environmental releases within the Department of Energy sites. As they are now, process sewer discharges at the fuels manufacturing facility do not comply with limits given in certain portions of the Washington State Dangerous Waste Regulations. Prevention of hazardous chemical discharges to the process sewers will help achievement of compliance with State of Washington standards and will allow the contractor an advantage in meeting future stringent environmental regulations now anticipated.

If FY 1987 funds are not made available, the project will be delayed one year. Delays in funding will mean continued use of the present sewer system. Such use will expose the environment to potential damage and make the operating contractor and Department subject to unfavorable publicity, imposition of fines, and increased regulation by State agencies. Also, any waste generator is responsible for costs of clean-up and any damages awarded as a result of CERCLA violations. Continued discharge of hazardous chemicals and radioactive materials to the soil will eventually contaminate the ground water, a situation that will make the operating contractor and Department subject to penalties for violation of RCRA regulations and censure by the Environmental Protection Agency and State. Also, legal action could be initiated by the state or a public interest organization to shutdown fuel fabrication operations pending cessation of discharges.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Reduced chemical discharges to process sewers Richland, Washington

2. Project No. 87-D-149

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10. Details of Cost Estimate [a]

	Item Cost	Total Cost
A. Definitive design, field engineering and inspection at approximately 7% of construction costs, item b		$ 140 [b]
B. Construction costs		2,400
Special facilities, process sewers	$2,400	
Subtotal		$2,540
C. Contingency at approximately 23% of above cost		610
Total estimated costs		$3,150

11. Methods of Performance

The project design will be under a negotiated architect-engineer contract. Construction and procurement will be accomplished by the onsite cost-plus-award-fee construction contractor because the system will be tied to existing process sewers and drains.

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[a] Based on completed conceptual design.

[b] Excludes $350,000 in FY 1985 PE&D funds to be used to initiate Definitive Design activities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Reduced chemical discharges to process sewers Richland, Washington

2. Project No. 87-D-149

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12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	Total
A. Total project costs						
1. Total facility costs						
(a) Construction line item	$ 0	$ 0	$ 0	$1,400	$1,750	$3,150
(b) PE&D..................	0	0	180	170	0	$ 350
(c) Inventories...........	0	0	0	0	0	0
Total direct costs....	$ 0	$ 0	$ 180	$1,570	$1,750	$3,500
2. Other project costs						
(a) R&D necessary to complete construction..	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Conceptual design costs	20	200	0	0	0	220
(c) Other project related costs..................	0	250	45	125	75	495
Total other project costs	$ 20	$ 450	$ 45	$ 125	$ 75	$ 715
Total project costs (Items 1 & 2)..........	$ 20	$ 450	$ 225	$1,695	$1,825	$4,215

B. Other related annual costs (estimated life of project: 20 years)

1. Facility operating costs..	$ 250
2. Programmatic operating expenses directly related to the facility..................	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility..	0
4. Maintenance, repair, GPP, or other construction related to programmatic effort for the facility..	0
Total related annual costs..	$ 250

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Reduced chemical discharges to process sewers Richland, Washington	2. Project No. 87-D-149

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total project funding
  1. Total facility
    (a) Construction Line Item -These are funds to be used for definitive design, procurement, and construction.
    (b) PE&D - FY 1985 PE&D funds in the amount of $350,000 will be used to initiate Definitive Design activities
    (c) Inventories - None
  2. Other project funding
    (a) R&D necessary to complete construction - None
    (b) Conceptual design funding - Expense funds in the amount of $220,100 were used for conceptual design, including preparation of a cost estimate for project authorization and environmental documentation.
    (c) Other project related funding - Included are the costs of project management.

B. Total related funding requirements - It is estimated that the new process sewer systems will be used for up to 20 years for programmatic purposes.

  1. Facility operating costs - These costs include the annual costs for operating, and maintaining monitoring equipment and for purchase of spare parts.

  2. Programmatic operating expenses directly related to the facility - None

  3. Capital equipment not related to construction but related to the programmatic effort in the facility - None

  4. Maintenance, repair, GPP, and other construction related to programmatic effort - None

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Nuclear Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars)

1. Title and location of project: Radioactive liquid effluent
Treatment facility (partial design only)
Richland, Washington

2. Project No. 87-D-150

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 2nd Qtr. FY 1989

4. Date construction ends: To be determined

5. Previous cost estimate: None

6. Current cost estimate: $4,000 [a]
Less Amount for PE&D 0
Net cost estimate: $4,000
Date: 3/85

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	4,000	4,000	4,000	3,000
1988	0	0	0	1,000

8. Brief Physical Description of Project

The proposed radioactive liquid effluent treatment project will provide a facility and all necessary equipment to treat radioactive liquid effluents now generated during normal operation of the Richland (RL) N Reactor. The proposed project will provide for the disposal of separated waste and partial recycle of demineralized water to the primary reactor coolant loop. In addition, this project will provide the necessary shielding to protect the environment and operating personnel from exposure to radiation hazards.

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[a] Partial design only; total cost of project will be approximately $85,000,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radioactive liquid effluent treatment facility (partial design only) Richland, Washington | Project No. 87-D-192

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8. Brief Physical Description of Project (cont'd)

As presently envisioned, the treatment plant will be a reinforced concrete structure capable of shielding the environment from radioactive releases; this facility will segregate the liquid waste streams and process equipment from the ventilation and control facilities. The facility walls will be designed such that radionuclide releases from fuel failures will not escape the treatment plant. Instrumentation will be provided in the facility for process control and monitoring in accordance with technical requirements.

FY 1987 funds will be used to initiate definitive design activities.

9. Purpose, Justification of Need for, and Scope of Project

The purpose of this project is to provide a treatment facility that will remove radioactive materials from process streams generated at the reactor. The facility will treat the streams so effectively that demineralized water may be recycled into the primary loop, radioactive liquid discharges to soil columns will be greatly reduced, and Department of Energy requirements concerning replacement of disposal to soil columns will be fulfilled.

The practice of using soil columns for the treatment of radioactive liquid wastes is being discontinued at Department of Energy sites. Current Department policy requires that other techniques be implemented for the treatment of low level waste generated at the N Reactor. No alternative other than disposal to the soil column is now available at the reactor site. The proposed radioactive liquid effluent treatment facility will provide a replacement to normal disposal to the soil column.

Operation of the proposed facility will allow other reactor systems to function more efficiently. Demands on the demineralized water treatment plant capacity will decrease markedly because demineralized water can be recycled to the primary loop from the radioactive liquid effluent treatment facility. Associated operating costs for the demineralized water treatment plant will be reduced. The trench and soil column will no longer be used for processing normal radioactive liquid effluent, significantly reducing the potential for release to the environment.

If this project is not funded, the discharge of liquid effluent to the soil column will continue. Prohibition of all discharges to the soil column without exception would cause a reactor shutdown with a resulting loss of production and steam revenues.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: [illegible]
[illegible]
[illegible]

2. Project No. [illegible]

10. Adequacy of Cost Estimate [illegible]

[illegible]

a. [illegible] . . . . [illegible]

11. Method of Performance

[illegible]

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY [illegible]	FY [illegible]	Total
a. Total project costs				
1. Total facility costs				
(a) [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(b) [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(c) [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total direct costs	[illegible]	[illegible]	[illegible]	[illegible]
2. Other project costs				
(a) [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(b) [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(c) [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total other project costs	[illegible]	[illegible]	[illegible]	[illegible]
Total project costs [illegible]	[illegible]	[illegible]	[illegible]	[illegible]

b. [illegible]

1. [illegible] . . . . . [illegible]
2. [illegible] . . . . . [illegible]
3. [illegible] . . . . . [illegible]
4. [illegible] . . . . . [illegible]
[illegible] . . . . . [illegible]

[illegible]

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[a] [illegible]

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radioactive liquid effluent treatment facility (partial design only) Richland, Washington — Project No. 87-D-150

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total project funding
  1. Total facility
    (a) Construction Line Item - These funds will be used for partial definitive design of the facility.
    (b) PE&D - none.
    (c) Inventories - none.

  2. Other project funding
    (a) R&D necessary to complete construction - none.
    (b) Conceptual design funding - Expense funds in the amount of $900,000 are required for completion of conceptual design, including preparation of a cost estimate for project authorization.
    (c) Other project related funding - Included are the costs of project management.

B. Total related funding requirements - It is estimated that the radioactive liquid effluent treatment facility will be used for 20 years for its programmatic purposes.

  1. Facility operating costs - These costs include the annual costs for operating and maintaining the effluent treatment facility and for purchase of spare parts.

  2. Programmatic operating expenses directly related to the facility - none.

  3. Capital equipment not related to construction but related to the programmatic effort in the facility - none.

  4. Maintenance, repair, GPP, or other construction related to the programmatic effort in the facility - none.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Environmental protection, plantwide
Savannah River, South Carolina

2. Project No.: 87-D-152

3. Date A-E initiated: 3rd Qtr. FY 1987

3a. Date physical construction starts: 1st Qtr. FY 1988

4. Date construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: None

6. Current cost estimate: $ 6,500
Less amount for PE&D 0
Net cost estimate $ 6,500
Date: 6/85

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 1,500	$ 1,500	$ 1,500	$ 300
1988	2,800	2,800	2,800	3,800
1989	2,200	2,200	2,200	2,400

8. Brief Physical Description of Project

This project provides facilities to prevent spills of hazardous and/or radioactive materials into groundwater or surface waters of the state of South Carolina. The facilities are varied and involve many different areas. Work includes:

- Spill containment for miscellaneous powerhouse and water treatment plant equipment in ten operating areas.
- Installing instrumentation on all hazardous chemical tanks greater than 1,000 gallon capacity to monitor tank level and alarm at high level in six operating areas.
- Rerouting demineralizer neutralization waste to ash basins; three operating areas.
- Curbed 1800 square foot buildings for storage of drums of hazardous or radioactively contaminated wastes in each of the four reactor areas.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental protection, plantwide
Savannah River, South Carolina

2. Project No.: 87-D-152

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8. Brief Physical Description of Project (continued)

o A waste collection tank with auxiliary oil decanting, drum unloading and truck loading facilities in each of the four reactor areas.
o Upgrading and adding spill containment facilities for the large chemical storage tanks in F and H Areas.

The materials to be contained are inorganic acids, caustic, tributyl phosphate, uranyl nitrate, miscellaneous inorganic chemicals and water contaminated with low level radioactivity and/or oil.

FY 1987 funds will be used for initial design, long-lead procurements, and placement of building contracts.

9. Purpose, Justification of Need for, and Scope of Project

The facilities proposed in this project are needed to prevent contamination of groundwater or surface waters of the state with radioactive and/or hazardous materials. DOE Order 5480.1A and the South Carolina NPDES Permit for the Savannah River Plant require protection against spills or leaks contaminating waters of the State.

Without the proposed facilities there is a potential for contaminating waters of the state. Failure to provide, or delaying the installation of, the proposed facilities subjects the environment to potential contamination and subjects DOE to possible punitive action by the state.

The Department has made commitments to the State of South Carolina that cleanup of spills at the Savannah River Plant will not be delayed. Show cause orders are still being negotiated with the State on previous spills. Significant spill problems have been experienced in the past and the problem continues. If funding for the proposed facilities is delayed, there is a potential of being fined by the State.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental protection, plantwide
Savannah River, South Carolina

2. Project No.: 87-D-152

10. Details of Cost Estimate [a/]

		Item Cost	Total Cost
A. Engineering design at approximately 12% of item B			$ 550
B. Construction costs...............................			4,672
1. Buildings			
a. Curbed storage buildings 4 @ 30x60x18	$ 515	$ 692	
b. Oil drum storage 8 @ 8x10x8 ft	65		
c. Additional lighting & electrical service.........................	112		
2. Special facilities		$ 3,676	
a. Equipment........................	$ 1,375		
b. Power wiring....................	170		
c. Instrumentation - Includes computer hardware & software interfacing.....	610		
d. Piping & insulation.............	1,521		
3. Standard equipment		2	
4. Improvements to land - sidewalks, curbs, & paving		290	
5. Utilities - railroads		12	
C. Removal cost...................................			153
Subtotal.....................			$ 5,375
D. Contingency at approximately 18% of above cost.....................................			975
F. Design and construction liaison, testing, checkout, and acceptance........................			150
Total Estimated Cost........			$ 6,500

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a/ The above estimates are based on completed conceptual design and feasibility studies.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental protection, plantwide
Savannah River, South Carolina

2. Project No.: 87-D-152

11. Method of Performance

Design will be performed by the operating contractor. Construction and procurement will be accomplished by the operating contractor utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

Prior Years	Prior Years	FY 1986	FY 1987	FY 1988	FY 1989	Total
A. Total Project Costs						
1. Total facility costs						
a. Construction line item	$ 0	$ 0	$ 300	$ 3,800	$ 2,400	$ 6,500
b. PE&D	0	0	0	0	0	0
c. Expense funded equipment	0	0	0	0	0	0
d. Inventories	0	0	0	0	0	0
Total facility costs	$ 0	$ 0	$ 300	$ 3,800	$ 2,400	$ 6,500
2. Other Project Costs						
a. R&D	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
b. Conceptual design	120	0	0	0	0	120
c. Other project related costs	50	175	25	0	0	250
Total other project costs	$ 170	$ 175	$ 25	$ 0	$ 0	$ 370
Total project costs (Item 1 & 2)	$ 170	$ 175	$ 325	$ 3,800	$ 2,400	$ 6,870

B. Other related annual costs (estimated life of project: 25 years)

	Annual Cost
1. Facility operating costs	$ 20
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to programmatic effort in the facility	0
Total other related annual funding requirements	$ 20

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental protection, plantwide
Savannah River, South Carolina

2. Project No.: 87-D-152

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total project costs
   1. Total Facility Costs
      a. Construction line item - No narrative required
      b. PE&D - None
      c. Expense funded equipment - None
      d. Inventories - None
   2. Other project costs
      a. R&D necessary to complete construction - None
      b. Conceptual design - No narrative required.
      c. Other project related costs - Engineering studies

B. Total related annual costs
   1. Facility operating costs - Added utility and maintenance costs
   2. Programmatic operating expenses directly related to the facility - None
   3. Capital equipment not related to construction but related to the programmatic effort in the facility - None
   4. GPP or other construction related to programmatic effort - None
   5. Other costs - None

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands Narrative material in whole dollars)

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1. Title and location of project: Reactor effluent cooling water thermal mitigation
Savannah River, South Carolina

2. Project No.: 87-D-156

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3. Date A-E work initiated 2nd Quarter FY 1987

3a. Date physical construction starts: 4th Quarter FY 1987

4. Date construction ends: 4th Quarter FY 1989

5. Previous cost estimate None

6. Current cost estimate $109,000
Less amount for PE&D: 0
Net cost estimate: $109,000
Date: 6/85

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7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$ 5,000	$ 5,000	$ 5,000	$ 5,000
1988	67,200	67,200	67,200	65,000
1989	36,800	36,800	36,800	39,000

8. Brief Physical Description of Project

This project will provide thermal mitigation systems for the effluent cooling water from C and K reactors. Each system will consist of a once-through forced draft cooling tower and a holding basin installed in series. The cooling towers will be approximately 300 feet in diameter with twenty-four, 32-foot diameter fans driven by 200 hp motors. The basins will be sized to provide a 24 hour thermal equalization period, at a nominal effluent flow of approximately 175,000 gpm, to prevent sudden changes in the discharge temperatures to the streams. Each system will require a 60 foot deep concrete pump pit, six 37,000 gpm pumps, and new 72" interconnecting piping. A pond outlet structure and discharge pipe will also be constructed to control discharges to the effluent stream.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Reactor effluent cooling water thermal mitigation Savannah River, South Carolina

2. Project No.: 87-D-156

8. Brief Physical Description of Project (Cont'd)

Electrical services to the reactor areas will be expanded to supply the additional load imposed by the cooling towers and pumps. Approximately 6.5 miles of high capacity overhead cabling will be installed together with new transformers. Two 600 square foot building additions will be required for the transformers.

A new 3,000 square foot control building will be erected to house the switchgear and instrumentation necessary for operation of the towers and their associated pumps. Instrumentation will be provided to measure and record discharge temperatures from the towers and basins. Backup controls will be provided in the existing central reactor control room.

The holding basins will have earth walls with concrete mixing baffles and headwalls. About 2 miles of electrical power lines will have to be relocated to provide clear space for the basins. Site work will consist of approximately 700 feet of paved service road and 8,000 feet of lighting and fencing in each area.

9. Purpose, Justification and Need for, and Scope of Project

The objective of this project is to provide thermal mitigation of the effluent from C and K reactors to bring the cooling water discharges into compliance with current South Carolina requirements. The proposed cooling systems will reduce the current water discharge temperature of about 170°F to less than or equal to 90°F (32.2°C) in accordance with the Water Classification Standards System of the State of South Carolina.

In January 1984, DOE and the South Carolina Department of Health and Environmental Control (SCDHEC) signed a consent order allowing the continued discharge of hot water effluent into tributaries of the Savannah River if DOE would complete and submit thermal mitigation studies and a recommended course of action to SCDHEC within 9 months of signing the order. In this study, which was completed in September 1984, 27 thermal mitigation alternatives for C and K Areas were evaluated. These ranged from various sized cooling ponds to recirculating and once-through towers. On the basis of cost, schedule, and minimal environmental impact, DOE recommended once-through cooling towers with a small off-stream discharge pond as the preferred alternative. In March 1985, SCDHEC completed their review of the DOE study and agreed that the chosen alternative was adequate to meet state standards.

1. Title and location of project: Reactor effluent cooling water thermal mitigation Savannah River, South Carolina

2. Project No.: 87-D-156

9. Purpose, Justification and Need for, and Scope of Project (Cont'd)

This project represents the current DOE preferred alternative, but the decision on the selection and implementation of the alternative cooling water systems will have to be accomplished in accordance with the National Environmental Policy Act. This action is required by the NPDES Consent Order between the DOE and the South Carolina Department of Health and Environmental Control (SCDHEC) and is necessary to bring the cooling water discharges into compliance with the Federal Water Pollution Control Act, as amended by the Clean Water Act. The preferred alternative must have the concurrence of the SCDHEC.

Fiscal year 1987 project funds will be used for engineering design.

10. Details of Cost Estimate [a]

		Item Cost	Total Cost
A. Engineering design at approximately 8% of construction costs Item B			$ 6,600
B. Construction costs			84,400
1. Improvements to land		$ 0	
2. Buildings		2,180	
a. Control houses (113-CK) 68'x44'-1 story	$ 1,560		
b. Control houses addn. (151-3KC) 30'x20'-1 story	310		
c. Control houses addn. (151-4KC) 30'x20'-1 story	310		
3. Other structures		58,550	
a. CW pump pits (111-KC)	5,690		
b. Cooling towers (112-KC)	42,660		
c. Holding ponds, KC (689G) (688G)	10,200		
4. Special facilities		23,670	
a. Equipment	6,290		
b. Piping	2,820		
c. Instruments	1,000		
d. Electrical	13,560		
C. Major computer items			0
D. Removal cost			440
Subtotal			$ 91,440

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[a] The above estimates are based on completed conceptual design and feasibility studies.

1. Title and location of project: Reactor effluent cooling water thermal mitigation
Savannah River, South Carolina

2. Project No.: 87-D-156

10. Details of Cost Estimate (Cont'd)

E. Contingency at approximately 18% of above costs	16,560
F. Design and construction liaison, testing, checkout and acceptance	1,000
Total Estimated Costs	$109,000

11. Method of Performance

Design and inspection shall be performed partially by the operating contractor and partially under a negotiated engineer contract. Construction and procurement shall be accomplished by the operating contractor, utilizing fixed-price subcontracts awarded by competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
A. Total project costs					
1. Total facility costs					
a. Construction line item	$ 0	$ 5,000	$65,000	$39,000	$109,000
b. PE&D	0	0	0	0	0
c. Expense funded equipment	0	0	0	0	0
d. Inventories	0	0	0	0	0
Total facility costs	$ 0	$ 5,000	$65,000	$39,000	$109,000
2. Other project costs					
a. R&D	0	0	0	0	0
b. Conceptual design and eng. studies	1,020	200	0	0	1,220
c. Other project related costs	1,550	0	0	0	1,550
Total other project costs	2,570	200	0	0	2,770
Total project costs (Item 1 & 2)	$ 2,570	$ 5,200	$65,000	$39,000	$111,770

1. Title and location of project: Reactor effluent cooling water thermal mitigation
Savannah River, South Carolina

2. Project No.: 87-D-156

12. Funding Schedule of Project Funding and Other Related Funding Requirements (Cont'd)

B. Other Related Annual Costs (estimated life of project: 15 years) b/

	Annual Cost
1. Facility operating costs	$7,900
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to programmatic effort in the facility	0
Total other related annual funding requirements	$7,900

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total project costs
  1. Total Facility Costs
    a. Construction line item - No narrative required
    b. PE&D - None
    c. Expense funded equipment - None
    d. Inventories - No inventories are needed for the proposed facilities.
  2. Other project costs
    a. R&D - None
    b. Conceptual design and engineering studies - Includes soil investigations, bid solicitation, survey of cooling tower constructors, preparation of Conceptual Design Report and cost estimate. Conceptual Design Report and Current Appraisal of Cost Estimate.
    c. Other project related costs - Funded from operating costs, include the preparation of the Environmental Impact Statement (EIS), estimated at $1,500,000 and the Safety Analysis Report, estimated at $50,000.

B. Total related annual costs
  1. Facility operating costs - Includes electric power for pump and fan operation; operations, maintenance, and health protection labor; and chemical treatment cost.
  2. Programmatic operating expenses directly related to the facility - None
  3. Capital equipment not related to construction but related to the programmatic effort in the facility - None
  4. GPP or other construction related to programmatic effort - None
  5. Other costs - None

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b/ FY 1990 dollars

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Environmental, health, and safety improvements Phase I, Feed Materials Production Center, Fernald, Ohio

2. Project No.: 87-D-159

3. Date A-E work initiated: 1st. Qtr. FY 1987

3a. Date physical construction starts: 3rd Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1992 a/

5. Previous cost estimate: None

6. Current cost estimate: $ 60,000 a/
Less amount for PE&D 0
Net cost estimate $ 60,000
Date: 6/85

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 10,000	$10,000	$10,000	$ 6,000
1988	21,000	21,000	21,000	12,400
1989	14,000	14,000	14,000	17,400
1990	9,000	9,000	9,000	16,800
1991	6,000	6,000	6,000	5,400
1992	0	0	0	2,000

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a/ Preliminary estimates for Phase I only. The total project is expected to in the range of $200 to $300 million. Definitive figures will be provided after completion of environment studies and conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental, health, and safety improvements Phase I, Feed Materials Production Center, Fernald, Ohio

2. Project No.: 87-D-159

8. Brief Physical Description of Project [b]

This project provides a series of improvements that will reduce uranium discharges from the Feed Materials Production Center (FMPC) and ensure that plant operations do not pose a threat to the environment, the community, or the work force. Problems experienced at the plant over the past few months mandate that the Department proceed with these improvements in an expeditious manner; therefore, initial project funding is being sought for the highest priority needs prior to the completion of pollution path studies and conceptual design. The scope of work described in this document encompasses those items believed most likely to be included in Phase I, but is not final. Necessary revisions will be identified during the FY 1987 congressional hearings and a more detailed scope description will be included in next year's budget submission.

Prevention of Water Contamination

It is estimated that approximately 75,000 kilograms of uranium has entered Paddy's Run Creek and other surface streams as a result of FMPC operations. A portion of this material has percolated into the groundwater and is suspected to be the source of the uranium contamination recently detected in three offsite wells.

One of the means by which uranium reaches the off-site streams is through rain water contact with the 65,000 drums of uranium bearing solids being held in out-of-door storage yards in various sections of the FMPC site. Uranium dust on the exterior surfaces of these drums is washed off by rainfall and eventually mitigrates to the streams. Accidental spills or leakage from the drums can be similarly transported with resulting contamination spread.

Equipment and facilities will be installed as part of Phase I to either eliminate or safely isolate those drums currently stored in the vicinity of Plants 2, 4, 8, and 9 from the environment. Elimination of the drums is preferred; however, a practical means of achieving this has not yet been identified. The estimate is, therefore, based on the construction of curbed, weather tight storage buildings sized to hold the total numbered of drums now in existence.

Some of the soil under the existing drum storage areas, and other plant areas, is contaminated as a result of past spills. This soil will be removed, where necessary, to prevent further leaching.

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[b] Reflects current intent only. Final scope will be established after resolution of environmental issues in accordance with National Environmental Policy Act requirements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental, health, and safety improvements
Phase I, Feed Materials Production Center,
Fernald, Ohio

2. Project No.: 87-D-159

8. Brief Physical Description of Project (Continued)

Water contamination can also occur as the result of extended rain water contact with finished uranium metals. Several hundred pallets of finished and reject uranium metal are currently stacked in outside locations due to the lack of interior storage space. This will be corrected through the construction of several small storage buildings. The storage buildings will be of rigid metal frame design with prefinished insulate metal siding and concrete slab floors. Lighting, heating, and fire protection will be provided.

Reduction of Atmospheric Emissions

Exhaust stack discharges have historically been the largest single source of radionuclide emissions from the FMPC. A number of dust filtration systems have already been upgraded in order to curtail these losses; however, additional work is required.

New higher efficiency dust collection systems will be installed on those remaining processes in Plants 1, 5, and 8 determined to be a source of off-site uranium contamination. High efficiency particulate air (HEPA) filters, bag filters or packed column scrubbers will be utilized depending on the properties of the exhaust gas involved and the quantity of radionuclide particulates present. The existing exhaust fans will have to be upgraded to compensate for the larger pressure drops and increased ventilation capacities that will be required for these new systems. Some structural and electrical modifications will also be necessary.

Building ventilation systems will be modified to reduce the buildup of aerosols or gases in the work areas and limit the spread of radiation in the event of an accidental spill. New ducting, fans, and controls will be installed, as necessary, to achieve proper air flow balances. Filters will be installed on building exhausts, where appropriate, to ensure that uranium dust is not discharged to the environment.

Separation of Clean and Contaminated Work Areas

The geographical arrangement of facilities at the FMPC makes contamination control difficult in that uranium can easily be tracked out-of-doors and there is not a clear separation of clean and dirty functions. The total work force utilizes a single change and shower facility located at the front of the plant. This facility is a significant distance from the various processing buildings and is accessible only by walking outside. If an employee has picked up uranium dust on either his company supplied work shoes or coveralls, it can brush off while he is in transite to the change facility. Radiation levels on the pathway leading into the change facility are significantly above background; indicating that material is inadvertantly being tracked from the process buildings.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental, health, and safety improvements Phase I, Feed Materials Production Center, Fernald, Ohio

2. Project No.: 87-D-159

8. Brief Physical Description of Project (Continued)

Radiation monitoring equipment and small auxilary change rooms will be installed at the main egress points of the processing buildings as partial solution to this problem. These will allow abnormally contaminated clothing to be intercepted before the employees leave the buildings and help to reduce the spread of uranium.

A number of modifications will also be made to clarify the boundary line between the clean and dirty portions of the site. These improvements will include: additional fencing, one-way turnstiles, the relocation of building doorways, a new freight elevator on the southwest side of the service building, and construction of a visitor's change room.

There is only one truck entrance into the site at the present time. Vendor's delivering raw materials to buildings located at the rear of the plant must cross the processing area on the same roads used to move uranium between various buildings. This results in an unnecessary potential for tracking of uranium off of the FMPC by these vehicles.

A new truck access road will be constructed outside of the processing area of the plant as part of Phase I to give a clean route to the north side of the site. Approximately 5,000 feet of drainage ditchwork, fencing and street lighting will be required for this road. A new guard station will be constructed at the entrance of the road in order to ensure adequate security.

A new dual entry warehouse will be built off of the new access road to serve the adjacent processing buildings. The warehouse will allow incoming materials to be unloaded and then transferred to the processing area without cross contamination. It is expected to be a prefabricated structural steel facility about 12,000 sq. ft. in size.

Air Samplers

Additional ambient air monitoring stations will be installed at selected off-site locations for verification of dose exposures to the public.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental, health, and safety improvements Phase I, Feed Materials Production Center, Fernald, Ohio

2. Project No.: 87-D-159

8. Brief Physical Description of Project (Continued)

Emergency Alarm Systems

FMPC employees are currently notified of emergency conditions through a system that uses coded horn blasts followed up by individual supervisory contact. This system is slow, subject to misinterpretation, and is not audible in all portions of the site. A new alarm and public announcement system will be installed as part of Phase I to ensure rapid, accurate communication. An off-site siren system will also be installed to notify the local community of emergencies requring immediate evacuation. The sirens will be augmented by a computer controlled automatic dialing telephone system that will be preprogrammed to notify state agency, and local officials of emergencies that affect the surrounding area.

ES&H Buildings

Office and laboratory space at the FMPC is extremely limited and is not adequate to accommodate the additional environmental, safety, and health functions that must now be performed. New space will, therefore, be provided under Phase I to meet these needs. This includes: a 12,000 square foot addition for employee medical services; approximately 20,000 square feet of analytical area; and, a 4,000 square foot Emergency Operations Center. All three buildings will be of masonry block construction.

Noncontaminated Solid Waste

Flyash from the FMPC boiler plant is currently stored in open outdoor piles. An engineered land fill is required to properly dispose of this, and other, noncontaminated solid waste. Such a landfill will be constructed as part of Phase I. It will be approximately 500,000 cubic foot in size. Permanent water sampling wells will be installed around the landfill to comply with Ohio EPA requirements.

Future Phases

Approximately $140 to $240 million dollars of additional work will be performed in the remaining phases of this project. The scope of these phases is highly dependent upon the outcome of currently ongoing environmental, health, and safety studies and the agreements to be reached with the many regulatory agencies involved. Work is expected to be included further cleanup of the liquid process effluent streams, controlled storage pads for Plant 1, final upgrades to the air cleaning systems, and the automation or modification of additional processes in order to reduce direct employee contacts with uranium. If, during the course of conceptual design, the benefits of any of these future tasks are determined to be greater than those obtainable, from the Phase I tasks current listed, the sequence of work will be rearranged.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental, health, and safety improvements Phase I, Feed Materials Production Center, Fernald, Ohio

2. Project No.: 87-D-159

9. Purpose, Justification of Need For, and Scope of Project

The measures provided by this project are required for the improved containment of radionuclides and other pollutants that are potentially hazardous to the environment, FMPC employees, and the public. Large tonnages of both depleted and slightly enriched uranium are processed at the FMPC daily with the resulting generation of undesirable effluents. Ingestion or inhalation of these effluents can pose a health risk; therefore, human exposures must be kept as low as reasonably achievable.

The effluent control systems in use at the FMPC were designed 25 years ago in a period of far more lenient environmental regulations. Removal efficiencies for respirable size particles are less than what could be obtained with state-of-the-art equipment. Also, there is generally only one containment barrier. This means that, if a component fails, it is possible for large quantities of contaminants to be released before an operator can intercede.

These deficiencies have led to a total of 170,000 kilograms of uranium being dispursed to the surrounding environs since 1952. Air, water, and soil samples taken at off-site locations all show above background concentrations of radionuclides as a result of plant operations.

The large scale release of pollutants from the FMPC has evoked considerable adverse sentiment from the U.S. Congress, Federal and State regulatory agencies, the media, and the public during the past half-year. The State of Ohio has filed a Notice of Intent to sue pursuant to Section 7002 of the Resource Conservation and Recovery Act. The U.S. Environmental Protection Agency is undertaking an investigation of the plant and has identified a list of major concerns related to radiation emissions and monitoring. The U.S. House of Representatives Subcommittee on Oversight and Investigation (Energy and Commerce) has indicated a concern and requested complete information. The U.S. Senate Committee on Government Affairs has conducted local hearings to explore the management of health and safety at the FMPC. The unions representing the employees at the FMPC have requested the National Institute for Occupational Safety and Health to investigate a list of issues. The plant has been the subject of adverse national radio and television news network coverage. And, local residents have initiated lawsuits against the Department of Energy and its current operating contractor.

In addition to their direct impact on health and safety, the adequacy of the FMPC's containment systems has an indirect bearing on the achievement of nuclear materials production goals. Two major production processes--Plants 5 and 9-- had to be partially shut down for 5 months this year because required effluent capture ratios could not be guaranteed. Similar shutdowns are possible in the future, with accompanying impacts on nuclear materials outputs, if radionuclide discharge problems cannot be corrected.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental, health, and safety improvements Phase I, Feed Materials Production Center, Fernald, Ohio

2. Project No.: 87-D-159

10. Details of Cost Estimate b/

	Item Cost	Total Cost
A. Engineering, Design, and Inspection at approximately 20% of Construction Costs, Item B		$ 8,000
B. Construction costs		40,500
1) Building Modifications	$12,000	
2) Other Structures	4,000	
3) Special Facilities	24,500	
Subtotal		$ 48,500
C. Contingency at approximately 24% of above costs		11,500
Total Project Cost		$ 60,000

11. Method of Performance

Design and inspection will be performed by a negotiated architect-engineer and/or the management and operating contractor. Construction and procurement will be accomplished by the management and operating contractor, utilizing fixed-price subcontracts to the extent feasible, awarded on the basis of competitive bids.

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b/ The above cost estimate is based on limited conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental, health, and safety improvements Phase I, Feed Materials Production Center, Fernald, Ohio

2. Project No.: 87-D-159

12. Funding Schedule of Project Funding and Other Related Funding Requirements

A. Total Project Costs	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	Total
1) Total Facility Costs								
a) Construction line item..	$ 0	$6,000	$12,400	$17,400	$16,800	$5,400	$ 2,000	$60,000
b) PE&D	0	0	0	0	0	0	0	0
c) Expense funded equipment	0	0	0	0	0	0	0	0
d) Inventories............	0	0	0	0	0	0	0	0
Total Facility Costs	$ 0	$6,000	$12,400	$17,400	$16,800	$5,400	$ 2,000	$60,000
2. Other Project Costs c/								
a) R&D necessary to complete construction ..	0	500	600	600	600	0	0	2,300
b) Other project related costs	2,500	0	0	0	0	0	0	2,500
Total Other Project Funding	2,500	500	600	600	600	0	0	4,800
Total Project Costs	$ 2,500	$6,500	$13,000	$18,000	$17,400	$5,400	$ 2,000	$64,800

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c/ For total project. Cost indicated under 12.A.1) are for Phase I only.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Environmental, health, and safety improvements
Phase I, Feed Materials Production Center,
Fernald, Ohio

2. Project No.: 87-D-[illegible]

12. Funding Schedule of Project Funding and Other Related Funding Requirements (Continued)

B. Total Annual Related Funding Requirement (Estimated Life of Project: 25 to 40 Years)

1) Facility Operating Costs	$ 0
2) Programmatic Operating Expenses Directly Related to the Facility	0
3) Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	0
4) GPP or Other Construction Related to Programmatic Effort in the Facility	0
5) Other Costs	0
Total Other Related Annual Funding Requirements	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding Costs
   (1) Total Facility
      a. Construction line item -- No narrative required.
      b. PE&D -- None.
      c. Expense funded equipment -- None
      d. Inventories -- None
   (2) Other Project Funding
      a. R&D necessary to complete construction -- technical studies and preparation of baseline documentation
      b. Other project related costs -- Conceptual design costs.

B. Total Annual Related Funding Requirements -- there will be no significant change in costs as a result of this project.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Productivity retention program, Phases I & II, Various Locations

2. Project No. 86-D-149

3. Date A-E Initiated: 1st Qtr. FY 1986

3a. Date Physical Construction Starts: 2nd Qtr. FY 1986

4. Date Construction Ends: 2nd Qtr. FY 1993 a/

5. Previous Cost Estimate:	$213,000
Less Amount for PE&D:	0
Less nonfunded equipment transfer:	2,500
Net Cost Estimate:	$210,500
Date: 12/84	
6. Current Cost Estimate:	$286,400 a/
Less Amount for PE&D:	0
Less nonfunded equipment transfer	4,300
Net Cost Estimate:	$282,100
Date: 6/85	

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	24,200	20,700	20,700	14,960
1986 Sequestered	0	(1,100)	(1,100)	(600)
1987	71,625	76,225	76,225	61,080
1988	95,130	95,130	95,130	90,100
1989	48,965	48,965	48,965	61,350
1990	28,665	28,665	28,665	32,780
1991	9,090	9,090	9,090	11,750
1992	1,275	1,275	1,275	7,380
1993	3,150	3,150	3,150	3,300

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a/ Change results from addition of Phase II, cost savings on some Phase I subprojects, and deletion of three unfunded Phase I subprojects.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Productivity retention program, Phases I & II
Various Locations

2. Project No. 86-D-149

8. Brief Physical Description of Project

This project provides for modernization and upgrading of existing nuclear materials production facilities at Savannah River, South Carolina; Fernald, Ohio; and Richland, Washington. Specific subprojects include:

a. Replace Thermal Diffusion Columns, SR (TEC $4,100,000; FY 1987 BA $2,100,000[b/])

This Phase I subproject provides an isotope separation process capable of replacing the aging thermal diffusion column process for separating gaseous hydrogen isotopes. The new process will be based on recently developed technology which uses two alternately heated and cooled palladium filled beds. Various pumping systems, storage tanks, valving, and a tritium-safe ventilated hood will be included to support the isotope separation process. All components will be installed in an existing building. Fiscal Year 1987 funds will be utilized to complete procurement and construction.

b. JB-line Productivity Retention, SR (TEC $70,000,000; FY 1987 BA $12,865,000)

This Phase I and II subproject provides for replacement of existing plutonium finishing components of the JB-line in Building 221-F. Phase I tasks include:

- Replace the two M-6 furnaces with new furnaces utilizing dielectric drying technology
- Replace the cation rotameter cabinet
- Automate a portion of the cation exchange process
- Rework the C-7 wet cabinet to improve ventilation and replace windows
- Upgrade and automate the mechanical line
- Provide a new distributive control system
- Remodel the south end standard structure to provide equipment access, new offices, storage area and rest room facilities
- A new vessel vent system
- Replace corroded ventilation duct work

Phase II tasks include:

- Replacement of pickling, end dumper, and finishing section of the mechanical line.
- Installation of a new solid waste packaging system.
- Automation of cation system operations.
- An expanded Distributed Control System.
- A high volume air monitoring system.
- Replacement of Precipitator Concentrate Feed Tank M-1, Filtrate Transfer Tank M-35, Flush Dissolver Adjustment Tank D-4, and associated equipment.

[b/] FY 1987 subproject BA's developed prior to FY 1986 Gramm-Rudman-Hollings reductions. Allocation between subprojects may change.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Productivity retention program, Phases I & II
Various Locations
2. Project No. 86-D-149

8. Brief Physical Description of Project (continued)

The FY 1987 funds will be used to continue design and initiate procurement and construction.

c. Replace Hot Canyon Cranes, SR (TEC $29,000,000; FY 1987 BA $11,080,000)

This Phase I subproject will replace two existing overhead bridge cranes in the F&H Separations Facilities' hot canyons. One new hot crane is being developed, tested, and built on a separate cost-funded project. A duplicate of the developmental crane will be fabricated and both cranes installed under this line item. The existing cranes will also be dismantled and removed. FY 1987 funds will be used to continue procurement, construction, and installation.

d. Foster Wheeler Boiler Retubing, RL (TEC: $6,300,000; FY 1987 BA $850,000)

This Phase I subproject provides for return of the Foster Wheeler boiler to a nuclear steam hot standby mode. Necessary work includes replacement of boiler steam tubes, modification of inner skin supports, and installation of a stack damper. The requested FY 1987 funding will be used to complete construction.

e. Drive Turbine Upgrades, RL (TEC: $2,500,000; FY 1987 BA $1,470,000).

This Phase I subproject will provide for replacement of the existing N Reactor mechanical turbine governors and improvement of the oil supply to the drive turbines. FY 1987 funding will be used for design and procurement.

f. Water Sampling System Upgrades, RL (TEC: $4,600,000; FY 1987 BA $1,000,000)

This Phase I subproject will provide for replacement of N Reactor's non-radioactive sample conditioning system and radioactive and non-radioactive sample analyzer equipment. FY 1987 funding will be used for design and initial procurements.

g. Radioactive Drain System Replacement, RL (TEC: $9,300,000; FY 1987 BA $1,900,000)

This Phase I subproject will provide for replacement of the 12-inch and 36-inch lines between the N Reactor Building Lift Station and the Waste Treatment Pilot Plant Facility. FY 1987 funding will be used to initiate design, procurement, and construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Productivity retention program, Phases I and II
Various Locations
2. Project No. 86-D-149

8. Brief Physical Description of Project (continued)

h. N Reactor Coolant System Components, RL (TEC: $24,800,000; FY 1987 BA $12,400,000)

This Phase I subproject provides for the rehabilitation of the primary coolant pump ancillary system, refurbishment of the V-11 flow control valves located on the reactor inlet connectors, and upgrading of the flow monitor system. The funds being requested in FY 1987 will be used to begin procurement and installation of the V-11 flow control valves and for design of the flow monitoring system.

i. Feed Materials Production Center Upgrade, OR (TEC: $95,000,000; FY 1987 BA $21,830,000)

This multi-phase subproject provides for the modernization of equipment at the Feed Materials Production Center (FMPC) which is utilized in the processing of depleted uranium and slightly enriched uranium in support of production reactor operations at Savannah River and Richland. The requested FY 1987 funds will be used for design, procurement, and construction. Phase I work includes:

- A new exhaust system for the process reactors.
- A new pressure swing absorption system to supply nitrogen to Plants 4, 5, and 9.
- New equipment and facilities for milling magnesium fluoride which has been used in casting enriched uranium derbies.
- Automation and modification of the refinery and Plant 8 sump systems.
- Acquisition of new pot and derby handling equipment.
- Installation of NO_x scrubbers on the scrap and chip pickling processes.
- Improved materials handling in the uranium reduction area.
- A new furnace to oxidize uranium with enrichments up to 10 percent.
- Combining the Plant 9 zirconium decladding process with the Plant 8 aluminum process.
- Replacement of the Plant 9 furnace and associated loading and burnout stations used to melt and cast uranium.

Phase II tasks will include:

- Equipment to process metal spills.
- Renovation of the depleted slag milling system and improvements to the associated dust collection equipment.
- Replacement of the Titan mill and ancillary equipment used to process magnesium fluoride slag into liner material.
- Upgrading of Plant 2 solvent extraction process.
- A new automated furnace for heat treatment of uranium ingots.
- Improved UF_4 packaging equipment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Productivity retention program, Phases I & II
Various Locations

2. Project No. 86-D-149

8. Brief Physical Description of Project (continued)

- o Digester feed system improvements in Plant 2.
- o Renovation of the crane used to unload hoppers at the rail spur.
- o New feed and off-gas systems for oxidation furnace number 1 in Plant 8.
- o A crusher and dust collection system in Plant 8.
- o A new digestion system for enriched uranium.

j. Canyon Process Control Automation, SR (TEC: $21,000,000; FY 1987 BA $3,030,000)

A new microprocessor-based, distributed control system will be provided for the F-Area Separations Canyon under this Phase II subproject. Batch sequencing operations, calculations, and data archiving will be performed automatically by the new system. Operator interface will be via CRT keyboards allowing information to be displayed in a more useful dynamic format. Some modifications to building space, the ventilation system, and the electrical supply system will be necessary. The funding being sought in FY 1987 will be used for initial design and long lead time procurements.

k. Improved Slug Processing Facilities, SR (TEC: $15,500,000; FY 1987 BA $7,700,000)

This Phase II subproject replaces a portion of the existing uranium-core slug manufacturing line. The components to be replaced include: the lubrication dip and drying station; an argon atmosphere furnace for heating the slug assemblies; the hot die size bonding press, a quench tank, the end bonder, and the shell blast cleaner. The new equipment will be designed and arranged for fully-automatic operation and ease of maintenance. FY 1987 funding will be used for initial design and procurement plus construction preparation.

9. Purpose Justification of Need for, and Scope of Purpose

Increased demands have been placed on the plants and equipment used to produce nuclear materials for weapons fabrications in recent years as the Department of Energy (DOE) attempts to satisfy the Department of Defense force structures specified in the Presidentially approved Nuclear Weapons Stockpile Memorandum. With the additional materials throughput that will occur with the startup of L Reactor; blending of the fuel-grade plutonium produced by the PUREX facility at Richland, Washington, with high-purity plutonium produced at Savannah River; and the introduction of other production initiatives, it will be necessary for this existing equipment to operate at an extremely high level of reliability. The purpose of the Productivity Retention Program is to increase the operating availability (utility factor) or efficiency of critical components or systems in keeping with this demand. It will also bring selected elements of the complex into compliance with technical or safety requirements that have either recently come into effect or that have only become applicable at the higher production rates now required.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Productivity retention program, Phases I & II
Various Locations
2. Project No. 86-D-149

9. Purpose Justification of Need for, and Scope of Purpose (continued)

Due to the size of the undertaking required and need to tightly sequence construction with available production windows, work will be requested in phases. Each phase will be constituted as an independent line item. Detailed justification for the major subprojects comprising Phases I and II follows:

a. Replace Thermal Diffusion Columns, SR

The new thermal diffusion column process being installed will provide significant higher capacity and efficiency while also relieving reliability and maintenance problems.

b. JB-Line Productivity Retention

The proposed physical improvements will:

- Increase process reliability and utility to meet production objectives.
- Reduce radiation exposure to personnel to a level which is as low as reasonably achievable within the existing JL-Line facility.
- Improve contamination control to reduce assimilation risk.
- Improve containment of process liquid to reduce product losses and prevent release to the environment.
- Reduce dependence on procedural control for protection against assimilations.
- Improve product quality (reduce impurities).
- Reduce criticality risk.

c. Hot Canyon Cranes, SR

The hot canyon cranes are used to charge irradiated targets into the dissolver and to replace failed separations process components. The cranes operate in a highly radioactive area that personnel can not enter and are a vital link to maintaining separations operations. During the 30 years in which they have been in service the condition of the cranes has deteriorated significantly. This deterioration results from a combination of wear, radiation damage, the corrosive environment in which the cranes operate, and the caustic chemicals that must be used for decontamination prior to maintenance activities. Repair times have increased dramatically in recent years and the cranes are presently out of service one out of every four hours. A good share of this increased down time traces to the inability to remove fixed contamination; a condition that will only worsen with time.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Productivity retention program, Phases I & II
Various Locations

2. Project No. [illegible]

9. Purpose Justification of Need for, and Scope of Purpose (continued)

d. Drive Turbine Upgrades, RL

N Reactor drive turbines are in need of extensive repairs to prevent a major outage caused by turbine failure. Governor replacement and oil supply improvements will maintain reactor production capabilities.

e. Water Sampling System, RL

Repair and replacement of the water sampling systems will assure the reactor is operated with water which meets current process standards for critical systems. State-of-the-art sampling equipment will allow quick, accurate analyses and better control.

f. Radioactive Drain System Replacement, RL

Replacement of the 12-inch and 36-inch radioactive drain lines will assure safe handling of radioactive and chemical effluents. New lines will allow ready monitoring of flow and will help prevent line leaks.

g. N Reactor Cooling System Components, RL

Replacement of the degraded N Reactor pump ancillary equipment will eliminate the extended maintenance outages currently necessary to keep the pumps in service. Upgrading of the flow monitor system and V-II valves will similarly reduce the number of reactor scrams caused by instrumentation and control system. The existing V-II valves ([illegible]) are nearing the point of failure. The valve discs are heavily pitted near the edges and eroded through at their connection with the shaft. As larger pieces of the disc begin to breakoff they will be carried downstream and are likely to become lodged in a flow monitoring venturi or a fuel tube. Either would cause the reactor to scram. These scrams will result in both lost special nuclear materials production and steam production revenues.

h. Feed Materials Production Center Upgrade, Fernald

Extensive equipment and safety improvements are required at the Feed Materials Production Center (FMPC) to assure the continued capacity to meet programmatic needs and increasingly stringent radiological and industrial safety requirements. The tasks included in Phases I and II will automate various process steps thereby increasing throughput and reducing operator exposures to both radiation and fumes.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Productivity retention program, Phases I & II
Various Locations

2. Project No. 86-D-149

9. Purpose Justification of Need for, and Scope of Purpose (continued)

i. Canyon Process Control Automation, SR

The F canyon is currently controlled via a manual process requiring approximately 900 written procedures. All data recordings, calculations, and material transfers must be performed by the operating staff. This approach is slow, manpower intensive, and subject to error. Approximately $3,400,000 a year can be saved by the installation of distributed control system (DCS) that would automate many of these operating steps. With such a system, tasks such as hot feed stabilization that now take 30 minutes to perform, could be completed in three minutes. The DCS will also allow the near-real time accountability readings required for improved safeguards.

j. Improved Slug Processing Facilities, SR

The present equipment has pressed two million slugs in its 16-year lifetime. Under current production forecasts, an additional two million slugs will have to be pressed over the next six years. The new equipment being installed by this subproject, will be designed for a higher throughput rate (3 slugs per minute) consistent with planned reactor operating schedules.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Productivity retention program, Phases I & II
Various Locations

2. Project No. 86-D-149

10. Details of Cost Estimate[a/]

Item	Item Cost	Total Cost
A. Engineering Design & Inspection at approximately 22% of Construction Costs, Item B		$ 40,615
B. Construction Costs		174,904
1) Buildings	$ 5,235	
2) Special Facilities	162,359	
3) Utilities	7,310	
C. Removals and Maintaining Production Costs		10,814
Subtotal (Items A, B, and C)		226,333
D. Contingencies at approximately 22% of above costs		48,477
E. Design & Construction Liaison, Testing Checkout, and Acceptance		7,290
Total Project Cost		$282,100[b/]

11. Method of Performance

Method of performance will vary with location. At Savannah River design will be performed by the operating contractor. Construction and procurement will be accomplished by the operating contractor, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible. At Fernald design and inspection will be performed with a negotiated architect-engineer contract. Construction and procurement will be accomplished by both cost-reimbursement and firm fixed-price contracts. At Richland design and inspection services will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed price contracts and subcontracts awarded on the basis of competitive bidding. Subproject g. will be pursued as a design-construct contract.

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a/ Based on varying degrees of conceptual design completion.

b/ Excludes $4,300,000 nonfunded equipment transfer for developmental hot canyon crane and prototype N Reactor drive turbine control system.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Productivity retention program, Phases I & II
Various Locations

2. Project No. 86-D-149

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	Total
A. Total Project Funding										
1) Total Facility Costs										
a. Construction Line Item ..$	0	$ 14,360	$ 61,080	$ 90,100	$ 61,350	$32,780	$11,750	$ 7,380	$ 3,300	$282,100
b. Plant Engineering and Design (PE&D)	0	0	0	0	0	0	0	0	0	0
c. Expenses Funded Equipment	4,300	0	0	0	0	0	0	0	0	4,300
d. Inventories	0	0	0	0	0	0	0	0	0	0
Total Inventory Costs	$ 4,300	$ 14,360	$ 61,080	$ 90,100	$ 61,350	$32,780	$11,750	$ 7,380	$ 3,300	$286,400
2) Other Project Funding										
a. R&D Necessary to Complete Construction ..	3,230	800	860	470	270	180	0	0	0	5,810
b. Conceptual Design	3,388	310	0	0	0	0	0	0	0	3,698
c. Engr. Studies	1,785	1,485	175	265	180	150	95	0	0	4,135
d. Other Project Related Costs	2,640	1,365	1,275	760	810	470	460	0	0	7,780
Total Other Project Funding	11,043	3,960	2,310	1,495	1,260	800	555	0	0	21,423
Total Project Funding	$15,343	$18,320	$63,390	$ 91,595	$62,610	$33,580	$12,305	$7,380	$3,300	$307,823

B. Total Related Funding Requirements (Estimated Life of Project - 20 to 40 years)

1) Facility Operating Costs	$(5,800)
2) Programmatic Operating Expenses Directly Related to the Facility	0
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	50
4) GPP or Other Construction Related to the Programmatic Effort in the Facility	50
5) Other Costs	400
Total Other Related Annual Funding Requirements	$(5,300)

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Productivity retention program, Phase I
Various Locations

2. Project No. 86-D-149

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total project funding

1) Total facility
   a. Construction Line Item - No narrative required.
   b. PE&D - None
   c. Expense Funded Equipment - Developmental SR hot canyon crane and prototype N Reactor drive turbine control system.
   d. Inventories - None

2) Other project funding
   a. R&D necessary to complete construction - Includes $4,560,000 for the two "JB-Line Productivity Retention" subprojects; $1,050,000 for the two FMPC Upgrades; and $200,000 for the "Improved Slug Processing Facilities" subproject.
   b. Conceptual Design - No narrative required.
   c. Engineering Studies - Includes studies for "JB-Line Productivity Retention," "Hot Canyon Cranes," "Thermal Diffusion Columns," "Canyon Process Control Automation,"and "Improved Slug Processing" subprojects.
   d. Other project related costs - Includes $3,300,000 for cost funded upgrading of instrumentation that provides input signals to computers being installed under for "Canyon Process Control Automation" subproject and $4,480,000 for management of Richland subprojects.

B. Total Related Funding Requirements

Annual operating cost will be significantly reduced as a result of improved system reliability and higher efficiencies. The figures shown do not include the dollar value of the increased nuclear materials output that will be achieved.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular Dollars in Thousands; Narrative Material in Whole Dollars)

1. Title and Location of Project: In-core neutron monitoring system, N reactor, Richland, Washington

2. Project No. 86-D-150

3. Date A/E work initiated: 2nd Qtr FY 1985 (PE&D)

3a. Date physical construction starts: 2nd Qtr FY 1986

4. Date construction ends: 2nd Qtr FY 1988 a/

5. Previous cost estimate: $7,550
Date: 3/84

6. Current cost estimate: $8,000
Less amount for PE&D: $ 450
Net cost estimate: $7,550
Date: 1/86

Financial Schedule

Fiscal Year	Authorization	Appropriation	Obligation	Costs
1986	$ 5,460	$ 5,460	$ 5,460	$ 4,100
1986 Sequestered	0	(330)	(330)	(250)
1987	$ 2,760	2,090	2,090	$ 3,250
1988	330	330	330	450

8. Brief Physical Description of Project

The proposed in-core neutron monitoring system project will provide a system to measure neutron flux levels at selected points in the reactor. The proposed system will replace an inoperative system that was installed in the reactor 20 years ago. That early system was rendered inoperative by detector burnout after 2 years of operation, leaving the only flux monitoring capability in the traveling wire flux mapping (TWFM) system. The TWFM system obtains a flux profile constructed from data obtained in nine different channels available in the reactor core.

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a/ Two quarter schedule delay resulting from Gram-Rudman-Hollings funding reduction.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: In-core neutron monitoring system, N reactor, Richland, Washington

2. Project No. 86-D-150

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8. Brief Physical Description of Project (Continued)

The proposed state-of-the-art system will provide automatic, real-time, three-dimensional power displays. As presently anticipated, a total of approximately 250 fixed detectors and one movable detector will be installed in the horizontal graphite cooling tubes. Less than 100 separate cooling tubes will be needed for the reactor graphite moderator.

The fixed detectors will be installed in the graphite cooling tubes to monitor neutron flux during reactor operation up to and including full power.

The movable detector will scan the neutron flux level during reactor shutdown and startup, but will be withdrawn during normal reactor operation. The movable detector will be inserted and withdrawn by a drive and transfer mechanism which will allow access to any one of approximately 20 guide tubes (drywells) in the Graphite and Shield Cooling System allowing the movable neutron flux probe to traverse the reactor core from side to side. The drive and transfer mechanism can be programmed or manually operated to allow automatic traverse of the reactor core or operator site selection. The drive and transfer mechanism will be operated from the reactor control room under normal conditions, but alternate controls will be provided at the drive mechanism location to facilitate maintenance and to assure system control. Personnel shielding will be provided to minimize personnel exposure from the stowed movable detector.

The outputs of the fixed detectors and the movable detector will receive electronic signal amplification, then they will be multiplexed into an existing computer. Continuous digital and graphic readouts will be provided. The system will detect a range of reactor flux from approximately 5×10^{10} to 5×10^{13} neutrons/cm^2-second, with system response to changes of flux of less than one second and system accuracy within ± 15%, with a 97% confidence level at the selected range.

System components will be placed in various locations in the reactor building.

Project activities will include definitive design, procurement, construction, and field engineering. Funds requested in FY 1987 will be used to continue construction.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: In-core neutron monitoring system, N reactor, Richland, Washington

2. Project No. 88-D-[illegible]

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9. Purpose, Justification of Need for, and Scope of Project

The installation of a state-of-the-art in-core neutron monitoring system will enhance operating surveillance capabilities, increase reactor productivity, and improve margins of safety for the reactor. At present, the only in-core flux-monitoring capability for the reactor is the travelling wire flux mapping (TWFM) system which obtains a flux profile from data obtained in nine different channels available in the reactor core. The TWFM uses flexible metal wires inserted into the reactor core that become activated by the neutron flux. When the wires are withdrawn, the radioactive isotopes must decay for 3 days before the wires can be reinserted. The TWFM system is outdated, costly to maintain, and shows signs of deterioration. The TWFM can be inserted and withdrawn only two or three times during an operating period, and any information derived can be evaluated only through time-consuming effort.

The proposed in-core system will provide automatic, real-time, three-dimensional power displays which will assist operators in detecting localized power peaking, will provide monitoring of global power changes, and will supply data for fuel management. Surveillance will be continuous, and the data will help maximize yield through maintenance of specific process tube power levels.

The industry which produces state-of-the-art in-core detectors like those proposed for use in this project has advanced considerably since in-core detectors were originally installed in this plant. New detector designs, materials, and data processing interfaces have increased equipment reliability and made information gathered by the detectors invaluable for reactor operation. Use of such in-core detectors will ensure data can be used to increase production in keeping with the mission given this reactor.

Safe operation of the reactor will be enhanced by an increased number of detector locations allowing detection of potential xenon and power oscillations.

An economic analysis of installation of the in-core neutron monitoring system and no-action alternatives revealed several benefits to be gained by installation of the proposed in-core system. The in-core system will cost $6,000,000 to install, but operating improvements to be gained will be equivalent to seven full power days of production outages per year valued at a total of $3,100,000 per year. Such improved operation will be possible because of the following benefits to be

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: In-core neutron monitoring system, N reactor, Richland, Washington

2. Project No. 86-D-150

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6. Purpose, Justification of Need for, and Scope of Project (Continued)

realized by the proposed in-core system. Assuming 20 scheduled and unscheduled outages per year, accelerated startup rates of 10 megawatts per minute would add four full power days. Verification that a newly charged tube with a failed temperature sensor is not mischarged will be possible (adding two full power days). More consistent achievement of a 4000-megawatt power level and operation at that power level for a year will also be possible (adding one full power day). Improvement of definitions of safety margins associated with local overpower protection and tube power limits should also be realized.

Other benefits will be gained by installation of the proposed in-core system. Among these is achievement of full core flux flattening through use of a fuel charge with fuel elements having different enrichments (such fuel is now available). Such a fuel charge will allow flux flattening in the axial direction and will give rise to improved conversion ratios. Flexibility of reactor operation is increased permitting either increased reactor production at a given plutonium-240 percentage, producing the same amount of material with a lower plutonium-240 percentage, or producing the same amount of 6 percent plutonium-240 in fewer operating days (permits longer maintenance outages.) Flattening the flux, thus the rate of local fluence accumulations, will support extending the life of the reactor by approximately 30 full power days per calendar year, which consists of about 185 full power days. Flux flattening will also provide more uniform product quality permitting longer operation between refuelings for a given plutonium-240 percentage. With a flattened core, certain operating margins can be redefined thus eliminating the imposition of certain very conservative operating constraints.

Added benefits in core surveillance and accident prevention will also be gained by installation of the proposed in-core system. Among these benefits are a means of measurement of core component movement, observation of rapid localized reactivity perturbation through use of special processing, and monitoring of dispersion of ball safety system materials in the reactor core.

If FY 1987 funds are not made available, installation will be delayed 1 year with an accompanying increase in project costs. A delay in funding would also mean continued use of the TWFM system with consequent increases in TWFM maintenance costs, delays in data evaluation and further losses of opportunities for increased production and revenues.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: In-core neutron monitoring system, N reactor, Richland, Washington

2. Project No. 86-D-150

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10. Details of Cost Estimate [a]

	Item Cost	Total Cost
A. Engineering, design and inspection at 3% of construction costs, item B		$ 180
B. Construction costs..		6,040
(1) Special facilities (includes the fixed and movable detectors and the transport mechanism)...		
o Procured items..	$4,420	
o Installation..	$1,620	
C. Standard equipment..		0
D. Removal less salvage..		0
Subtotal................		$ 6,220
E. Contingency at approximately 21% of the above costs..........................		$ 1,330
Total estimated costs...		$ 7,550

This cost estimate is based upon a conceptual estimate made by the on-site Architect-Engineer; a final estimate will be incorporated in the conceptual design Report, and any changes made will be incorporated into a revision of this Construction Project Data Sheets.

11. Methods of Performance

The project design and inspection services will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed price contracts and subcontracts awarded on the basis of competitive bidding.

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[a] Does not include $450,000 in FY 1985 PE&D funds.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: In-core neutron monitoring system, N reactor, Richland, Washington

2. Project No. 86-D-150

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior years	FY 1986	FY 1987	FY 1988	Total
a. Total project costs					
1. Total facility costs					
(a) Construction line item..............	$ 0	$3,850	$3,250	$ 450	$7,550
(b) PE&D................................	410	40	0	0	450
(c) Inventories.........................	0	0	0	0	0
Total direct costs..................	$ 410	$3,890	$3,250	450	$8,000
2. Other project costs					
(a) R&D necessary to complete construction	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Conceptual design costs..............	150	0	0	0	150
(c) Other project related costs..........	50	50	130	0	230
Total other project costs............	$ 200	$ 50	$ 130	$ 0	380
Total project costs (Item 1 & 2).....	$ 610	$3,940	$3,380	$ 450	$8,380

b. Other related annual costs (estimated life of project: 20 years)

1. Facility operating costs..	$ 150
2. Programmatic operating expenses directly related the facility...............................	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility..	200
4. Maintenance, repairs, GPP, or other construction related to programmatic effort for the facility......	0
Total related annual costs..	$ 350

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: In-core neutron monitoring system, N reactor, Richland, Washington

2. Project No. 86-D-150

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
   1. Total facility
      (a) Construction Line Item - These are funds to be used for construction.
      (b) PE&D - FY 1985 PE&D will provide for architect-engineer services to accomplish design (including software) and to prepare equipment specifications.
      (c) Other project related funding - Included are the costs of project management, project support, project start-up, and training.

b. Total related funding requirements - It is estimated that the in-core neutron monitoring system will be used for seven to 20 years for its programmatic purposes.

   1. Facility operating costs - These costs include the annual costs for operating and maintaining monitoring equipment and for purchase of spare parts.

   2. Programmatic operating expenses directly related to the facility - none.

   3. Capital equipment not related to construction but related to the programmatic effort in the facility - These funds will be used in FY 1987 for control room simulator modifications.

   4. Maintenance, repair, or other construction related to programmatic effort - none.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

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1. Title and Location of Project: PUREX electrical system upgrade, Richland, Washington

2. Project No. 86-D-151

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3. Date A-E work initiated: 2nd Quarter FY 1985

3a. Date physical construction starts: 2nd Quarter FY 1986

4. Date construction ends: 4th Quarter FY 1988

5. Previous cost estimate: $ 8,300
Date: 2/84

6. Current cost estimate: $ 9,500
Less amount for PE&D: $ 1,200
Net Cost estimate: $ 8,300
Date: 12/85

7. Financial Schedule

Fiscal Year	Authorization	Appropriation	Obligation	Costs
1986	2,500	2,500	2,500	1,500
1986 Sequestered	0	(120)	(120)	(75)
1987	3,780	3,900	3,900	4,500
1988	2,020	2,020	2,020	2,375

8. Brief Physical Description of Project

This project will upgrade three electrical systems within the PUREX Plant that have been determined to be incapable of supporting long-term plant operation and process expansion. In their present condition, the electrical systems are hazardous to personnel and require excessive maintenance. The three systems are process wiring, motor control centers, and lighting.

Much of the original process wiring throughout the PUREX Pipe and Operating (P&O) Gallery will be replaced. Cable runs will be separated by electrical function to reduce the induced noise in the instrument systems and nearby power and high voltage wiring will be shielded to eliminate induced voltage and false signals on essential monitoring and control circuits. Wiring for the area radiation monitors, emergency power circuits, and normal power circuits will be replaced with wiring that complies with current applicable codes and standards.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: PUREX electrical system upgrade,
Richland, Washington

2. Project No. 86-D-151

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8. Brief Physical Description of Project (Cont'd)

The existing Motor Control Centers will be replaced to insure that the systems meet current electrical safety codes. The new Motor Control Centers and new feeder cables will be compatible with the existing low voltage (480 Volt) distribution system of the PUREX Plant. Branch circuit protection devices will be circuit breakers unless the load serviced requires a fused device to meet UL requirements. All motor starters will have motor circuit protectors providing overcurrent protection on all phases.

Much of the incandescent lighting throughout the PUREX Plant will be replaced with more efficient, longer life lighting fixtures. Lighting in the PUREX Canyon will be replaced by high intensity discharge fixtures using remote ballasts. Fluorescent light fixtures with exposed tubes and fixtures without tube locking devices also will be replaced. Lighting systems will be upgraded in those areas where the illumination levels are substandard for the work being performed.

9. Purpose, Justification of Need, and Scope of Project

The purpose of this project is to improve the reliability of PUREX Plant operations, provide for future plant processes, reduce maintenance and remove safety hazards to personnel.

Most of the electrical equipment and wiring to be improved or replaced has been in place since the PUREX Plant was completed in 1956 and is not suitable for longer-term plant operation, being in deteriorated condition. The Motor Control Centers are obsolete, so that replacement parts are not readily available and can be obtained only at premium cost. Some equipment has been installed in enclosures that do not provide the desired protection from the working environment. Much of the maintenance work on this equipment must be performed with the equipment energized, creating difficult working conditions, with the only alternative being to shut down parts of the plant during that maintenance.

The process wiring now in use is susceptible to failure since it is installed in crowded wireways with some wiring operating at higher voltage and current than the original design. This leads to overheating, cracking and failure of the insulation. Shorting due to the loss of insulation would cause a failure of many additional wires near the point of failure and require an extensive plant repair outage and possible losses in production. Power cables and instrumentation wiring in the same wireways produce induced noise and false signals in the instrument readings. Further, it is extremely difficult and time consuming to make wire replacements.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: PUREX electrical system upgrade, Richland, Washington | 2. Project No. [illegible]

9. Purpose, Justification of Need, and Scope of Project (Cont'd)

A change from obsolete incandescent lighting to long-life lamps is especially desirable in those areas of the plant that are relatively inaccessible due to high radiation levels or airborne contamination. The existing lighting requires extensive maintenance that increases the radiation exposure to maintenance personnel. In addition to these conditions, many areas of the plant have substandard illumination levels for the work being performed.

PUREX Plant resumed operations in Fiscal Year 1984. Interruptions in plant operation can be expected due to electrical equipment failures if the equipment is not upgraded. Maintenance costs will be high both for labor and for replacement of parts for obsolete equipment. Work required in radiation zones will increase personnel radiation exposure, and deficiencies under difficult working conditions will not be corrected. The continuity of plant operations and long-range production plans will be impacted.

Delays in completing the project will require operating the plant under these undesirable and presently [illegible] conditions. A major failure in the electrical system could require a plant shutdown of from one to twelve weeks for repairs while plant operating expenses of approximately $1,000,000 per week continue to be incurred, and [illegible] in a result of production loss/delays of approximately 3 metric tons produced per day. The FY 1987 funding will be used to continue procurement and construction.

10. Details of Cost Estimate

	Total Cost
a. Engineering design and inspection at 27% of construction costs	$ 1,000 a/
b. Construction costs	[illegible]
Subtotal	$ [illegible]
c. Contingency at approximately 23% of above cost	[illegible]
Total project cost	$ [illegible]

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a/ Includes $1,200,000 in FY 1986 PE&D funds.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: PUREX electrical system upgrade, Richland, Washington

2. Project No. 86-D-151

11. Method of Performance

Definitive design and field engineering will be performed by the Hanford on-site Architect-Engineer contractor. Construction will be performed by the Hanford on-site construction services contractor on a Cost Plus Award Fee basis. Equipment procurement will be on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	Total
A. Total project costs						
1. Total facility costs						
a. Construction line item	$ 0	$ 0	$ 815	$4,500	$2,985	$ 8,300
b. PE&D	0	540	660	0	0	1,200
c. Expense-funded equipment and inventories	0	0	0	0	0	0
Total facility costs	$ 0	$ 540	$1,475	$4,500	$2,985	$ 9,500
2. Other project costs						
a. R&D to complete construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
b. Conceptual design costs	250	0	0	0	0	250
c. Other project related costs	0	50	100	75	75	300
Total other project funding	$ 250	$ 50	$ 100	$ 75	$ 75	$ 550
Total project costs	$ 250	$ 590	$1,575	$4,575	$3,060	$10,050

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: PUREX electrical system upgrade, Richland, Washington	2. Project No. 86-D-151

12. Funding Schedule of Project Funding and Other Related Funding Requirements (Cont'd)

B. Other related annual costs

	Annual Costs
1. Facility maintenance and operating cost	$ 0
2. Programmatic operating expenses	0
3. Capital equipment not related to construction	0
4. GPP or other construction related to project	0
Total related annual cost requirement	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total project funding
   1. Total facility costs
      a. Construction line item total cost estimate is $9,500,000. Construction is scheduled from the second quarter of FY 1986 through the fourth quarter of calendar year 1988.
      b. Plant engineering and design funding provided for the early start of definitive design.
      c. Expense funded equipment and inventory funding are not requested.

   2. Other project funding
      a. Research and development - None
      b. A conceptual design has been completed at a cost of $250,000.
      c. Other project related costs include project management and functional support by Rockwell Hanford Operations.

B. Other related funding requirements
   1. Facility maintenance and operating costs for the electrical equipment to be improved by this project are included in the operating cost of the PUREX Plant, estimated to be $60,000,000 annually.
   2. No programmatic operating expenses are requested.
   3. No capital equipment not related to construction funding is requested.
   4. No GPP or other construction funding is requested.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Reactor electrical distribution system
Savannah River, South Carolina

2. Project No.: 86-D-152

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3. Date A-E work initiated: 2nd Qtr. FY 1986

3a. Date physical construction starts: 1st Qtr. FY 1987

4. Date construction ends: 2nd Qtr. FY 1989 b/

5. Previous cost estimate: $22,550
Date: 3/84

6. Current cost estimate: $21,000 a/
Less PE&D: 0
Net cost estimate: $21,000
Date: 1/86

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7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$ 2,000	$ 3,000	$ 3,000	$ 1,390
1986 Sequestered	0	(290)	(290)	(130)
1987	8,410	7,700	7,700	6,610
1988	7,090	7,090	7,090	8,410
1989	3,500	3,500	3,500	4,720

8. Brief Physical Description of Project

This project provides for the following improvements to the electrical systems of the four nuclear materials production reactors at Savannah River:

- Replacement of rotating electrical generating equipment with a 150 kva uninterruptible power supply (UPS) system for electrical loads essential to reactor safety. The UPS system will supply power to emergency systems via two separate and redundant cable systems, in accordance with current separation criteria.

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a/ Cost revised to reflect lower escalation forcast and funding availability.
b/ One quarter delay incurred as a result of funding stretchout.

1. Title and Location of Project: Reactor electrical distribution system
   Savannah River, South Carolina

2. Project No.: 86-D-152

8. Brief Physical Description of Project (Cont'd)

- Upgrading the monitoring and control circuits for automatic transfer switches (ATS) that transfer power source for critical equipment to an alternate supply should normal supply become unavailable. The monitoring circuit revision will include adding indications of switch position in the reactor control room to supplement the existing field indication and adding an alarm in the control room to indicate whenever any of the seven critical ATS's fails to transfer properly.

- Redistributing critical electrical loads among the sources of emergency electrical supply and removing non-critical loads from the emergency supply.

The FY 1987 funds will be used to continue design and procurement and to initiate construction.

9. Purpose, Justification of Need for and Scope of Project

A comprehensive safety analysis study of the SRP reactor electrical distribution system (REDS) has confirmed the reliability of REDS but identified several areas that should be upgraded to meet current industry practices and advancing technology.

Presently the emergency bus of the Electrical Distribution System (EDS) supplies approximately 1750kw of non-emergency load. This equipment is designed to automatically shutdown during loss of normal power and procedural controls prevent restart. This is contrary to current industry practice. Overload of emergency generators could occur if the equipment remained connected to the emergency bus during an emergency due to failure of the equipment to load shed or due to personnel error.

Automatic transfer switches (ATS) are used throughout REDS to switch electrical power between alternate feeds to critical equipment. Currently Central Control Room (CCR) instrumentation does not provide indications of ATS position. This data must be obtained by deploying personnel to the ATS field location. Also some of the ATS's require manual reset, at the ATS, to return to the normal power position. Response to accident situations can be enhanced if the status and control of the ATS's is readily available to the CCR operator. One of these ATS in each reactor switches between alternate DC sources for operation of critical emergency bus tie-breakers. Solid state devices are now available which can replace the ATS and increase system reliability.

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1. Title and Location of Project: Reactor electrical distribution system
Savannah River, South Carolina

2. Project No.: 86-D-152

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9. Purpose, Justification of Need for, and Scope of Project (Cont'd.)

Power to reactor building building instrumentation is maintained during the time between normal power failure and starting of main emergency generators by continuously operating battery powered motor generator sets. This rotating equipment and associated controls have been in service since plant startup. Adequate spare parts are no longer available and the system is increasingly difficult to maintain. Solid state uninterruptible power supply (UPS's) are now available to replace these units and afford improved system operating characteristics. In addition, the system can be reconfigured to meet current SRP guidelines for physical separations criteria.

10. Details of Cost Estimate [c/]

		Item cost	Total cost
A. Engineering design at approximately 28% of construction costs, Item B			$ 3,267
B. Construction costs			11,815
1) Building Modifications		73	
2) Major Equipment		3,167	
a. Uninterruptible power supplies	1,872		
b. Switches and breakers	919		
c. Starters and motor control centers	376		
3) Electrical		8,136	
4) Mechanical		439	
C. Removal costs			1,784
Subtotal (Items A, B, and C)			$16,866
D. Contingencies at approximately 19% of above costs			3,172
E. Design and construction liaison, testing, checkout and acceptance			962
Total estimated cost			$21,000

11. Method of Performance

Design and construction will be performed by the operating contractor. Procurement will be accomplished by the contractor. Procurement will be accomplished by the operating contractor utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

[c/] This estimate is based on complete conceptual design.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: Reactor electrical distribution system
Savannah River, South Carolina

2. Project No.: 86-D-152

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12. Funding Schedule of Project Funding and Other Related Requirements

A. Total project costs	Prior Years	FY 1986	FY 1987	FY 1988	FY 1989	Total
1) Total facility costs						
a) Construction line item	$ 0	$ 1,260	$ 6,610	$ 8,410	$ 4,720	$21,000
b) PE&D	0	0	0	0	0	0
c) Expense funded equipment	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0
Total facility costs	$ 0	$ 1,260	$ 6,610	$ 8,410	$ 4,720	$21,000
2) Other project costs						
a) R&D necessary to complete construction	$ 310	$ 75	$ 0	$ 0	$ 0	$ 385
b) Other project related costs	0	0	0	0	0	0
Total other project costs	$ 310	$ 75	$ 0	$ 0	$ 0	$ 385
Total project costs (Items 1 and 2)	$ 310	$ 1,335	$ 6,610	$ 8,410	$ 4,720	$21,385

B. Other related annual costs (Estimated life of project: 40 years)

1) Facility operating costs..	$ 0
2) Programmatic operating expenses directly related to the facility............	0
3) Capital equipment not related to construction but related to the programmatic effort in the facility....................................	0
4) GPP or other construction related to the programmatic effort in the facility	0
Total other related annual costs..	$ 0

13. Narrative explanation of total project funding and other related funding requirements:

A. Total project costs
1) Total facility costs
a) Construction line item - Narrative not required
b) PE&D - None
c) Expense funded equipment - None
d) Inventories - No inventories are needed for the proposed facilities

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Replace electrical distribution system [illegible] 2. Project No.: [illegible]

[illegible]

10. Narrative explanation of total project funding and other related funding requirements: (Cont'd)

a) Other project costs:

(1) A&E : Includes conceptual design costs of $[illegible] and engineering (Title I) costs of $[illegible]

(2) Other project related costs : None

b. Other related project costs:

(1) Facility operating costs : None

(2) Programmatic operating expenses directly related to the facility : None

(3) Capital equipment not related to construction but related to the programmatic effort in the facility : None

(4) GPP or other construction related to programmatic effort in the facility : None

(5) Other costs : None

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Additional line III furnace
Savannah River, South Carolina

2. Project No.: 86-D-153

3. Date A-E work initiated: 1st Qtr. FY 1986

3a. Date physical construction starts: 3rd Qtr. FY 1987

4. Date construction ends: 3rd Qtr. FY 1989 a/

5. Previous cost estimate: $16,000

6. Current cost estimate: $16,000
Date: 9/85

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	1,500	2,000	2,000	1,250
1986 Sequestered	0	(195)	(195)	(100)
1987	7,605	7,300	7,300	4,850
1988	6,895	6,895	6,895	7,900
1989	0	0	0	2,100

8. Brief Physical Description of Project

This project provides for the design, procurement and installation of an additional electrically heated vacuum furnace to extract tritium from irradiated target elements. The new furnace will be installed in an existing building adjacent to similar units. The building's process piping and tankage are adequate to handle the additional furnace's output; however, the electrical supply system must be enlarged.

A new tritium confinement system will also be installed as part of this project. The system will serve both the new and existing furnaces and will reduce tritium losses during changing by approximately 90 percent. The confinement equipment will be housed in a new 3240 square foot building addition designed to comply with the Department's "resistant structure" criteria.

FY 1987 funding will be used to continue design and procurement and start construction.

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a/ Delayed 6 months as a result of funding stretchout.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Additional line III furnace Savannah River, South Carolina	2. Project No: 86-D-153

9. Purpose, Justification for, and Scope of Project

The purpose of this project is to provide additional production equipment. Tritium extracted from irradiated reactor targets (virgin tritium) supplements recycled tritium which is returned to Savannah River from the military. The tritium confinement system included with the new extraction furnace is required to mitigate the postulated unacceptable operating losses of tritium to the atmosphere which will result from virgin tritium production.

10. Details of Cost Estimate [a]

		Item Cost	Total Cost
A. Engineering design and inspection at 23% of construction costs			$ 2,400
B. Construction Costs			10,315
1) Buildings		930	
2) Special facilities		9,385	
a) Piping	1,241		
b) Electrical	1,113		
c) Instrumentation	938		
d) Equipment	6,093		
C. Removal costs			80
Subtotal (Items A, B, and C)			12,795
D. Contingencies at approximately 18% of above costs			2,305
E. Design and construction liaison, testing, checkout, and acceptance			900
Total estimated cost			$16,000

11. Method of Performance:

The operating contractor will perform design and engineering. The operating contractor will accomplish construction and procurement, utilizing fixed price subcontracts awarded on the basis of competitive bidding to the extent feasible.

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[a] Estimate based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Additional line III furnace
Savannah River, South Carolina

2. Project No.: 86-D-153

12. Funding Schedule of Project Funding and Other Related Requirements:

A. Total project costs	Prior Years	FY 1986	FY 1987	FY 1988	FY 1989	Total
1) Total facility costs						
(a) Construction line item	$ 0	$ 1,150	$ 4,850	$ 7,900	$ 2,100	$16,000
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	100	50	0	150
Total facility costs	$ 0	$ 1,150	$ 4,950	$ 7,950	$ 2,100	$16,150
2) Other project costs						
(a) Conceptual design	$ 120	$ 0	$ 0	$ 0	$ 0	$ 120
(b) Other project related costs	0	$ 100	$ 100	$ 50	$ 0	$ 250
Total other project costs	$ 120	$ 100	$ 100	$ 50	$ 0	$ 370
Total project costs (Items 1 and 2)	$ 120	$ 1,250	$ 5,050	$ 8,000	$ 2,100	$16,520

B. Other related annual costs (estimated life of project: 20 years)

1) Facility operating costs	$ 150
2) Programmatic operating expenses directly related to the facility	0
3) Capital equipment not related to construction but related to the programmatic effort in the facility	50
4) GPP or other construction related to the programmatic effort in the facility	0
5) Other costs	50
Total related annual costs	$ 250

13. Narrative of Total Project Funding and Other Related Funding Requirements

A. Total project costs
1) Total facility costs
a) Construction line item - no narrative required
b) PE&D - none
c) Expense funded equipment - none
d) Inventories - repair parts for process valves, programmable controllers, catalyst, and furnace crucibles
2) Other project costs
a) Conceptual design - includes funds to prepare cost estimates
b) Other project related costs - includes R&D, engineering studies, alternative studies, start-up, procedure development, and initial facility certification.

1. Title and Location of Project: Additional line III furnace
Savannah River, South Carolina

2. Project No.: 86-D-153

13. Narrative of Total Project Funding and Other Related Funding Requirements (Cont'd)

B. Other related annual costs
   1) Facility operating costs - includes costs of labor, material, and utilities for a seven-day week, four-shift schedule
   2) Programmatic operating expenses directly related to the facility - none
   3) Capital equipment not related to construction but related to the programmatic effort in the facility - estimated cost to replace capital equipment in associated support systems
   4) GPP or other construction related to programmatic effort in the facility - cost to update or improve items
   5) Other costs - operator training, facility certification and inspection, and other assigned miscellaneous costs.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Effluent treatment facility
Savannah River, South Carolina

2. Project No. 86-D-154

3. Date A-E work initiated: 1st Quarter FY 1986

3a. Date physical construction starts: 4th Quarter FY 1986

4. Date construction ends: 2nd Quarter FY 1989 a/

5. Previous cost estimate: $55,000
Date: 4/84

6. Currently cost estimate: $50,000
Less amount for PE&D: 0
Net cost estimate: $50,000 b/
Date: 12/85

7. Financial Schedule

	Fiscal Year	AUTHORIZATION	APPROPRIATIONS	OBLIGATIONS	COSTS
	1986	$ 2,500	$ 2,500	$ 2,500	$ 2,500
Proposed	1986 Reprogramming c/	$ 6,100	6,100	6,100	3,900
	1987	15,650	15,650	15,650	12,500
	1988	15,150	15,150	15,150	19,250
	1989	10,600	10,600	10,600	11,850

8. Brief Physical Description of Project

This project provides for the design, procurement, and construction of a new wastewater storage and treatment facility to process routine wastewater and spills for the F and H Areas. The project will include:

o A 235 gallon per minute capacity treatment process, with limited redundant backup capacity, comprised of: multimedia filtration (submicro filtration, iron removal, and activated carbon); reverse osmosis; ion exchange; and evaporation.

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a/ Construction necessary to support facility operation will be complete November 1988.
b/ Reflects reduced escalation forecasts and schedule acceleration resulting from proposed reprogramming.
c/ Required to meet Resource Conversation and Recovery Act mandated schedule (November 1988) for termination of discharges to F&H seepage basins.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Effluent treatment facility
Savannah River, South Carolina
2. Project No. 86-D-154

8. Brief Physical Description of Projects - (Continued)

- A 28,400 sq. ft. building to house the processing equipment, house a control room, change facilities, and associated offices.
- Two smaller motor control centers measuring approximately 800 sq. ft. each.
- Two storage basins of 2.0 million gallons capacity each and two above ground waste water storage tanks of 450,000 gallons capacity each.
- Transfer lines connecting the basins and tanks (located in two different operating areas), the treatment plant and the H Area waste tank farm.
- Two process waste water lift stations with 50,000 gallon stainless steel tanks in underground concrete containment sumps.
- Associated roadways and parking facilities.

Since the facility will handle radioactive and nonradioactive hazardous waste, the project will provide shielding of process equipment; leak detection systems for the storage basins and jacketed transfer lines; and filtered exhaust systems for the enclosed regulated areas and some process vessels.

9. Purpose, Justification of Need for, and Scope of Project

Process wastewaters from separations and waste management operations in the F and H Areas contain small quantities of radionuclides plus nonradioactive hazardous elements such as mercury and chronmium. Under past regulations it was possible to discharge these waters and their associated contaminants to earthen seepage basins. This means of disposal is now banned under the "Hazardous and Solid Waste Amendments of 1984" and must be discontinued by November 1988. Project 86-D-154 provides the facilities necessary to remove the pollutants from future wastewaters and terminate the use of the seepage basins.

The project also provides for the treatment of potentially contaminated separations canyon cooling water and storm water runoff from the waste tank farm. Both of these effluent streams have to date been drained to the seepage basins. Due to the large variations in rate of flow of these streams, it is economically necessary to provide temporary storage capacity for surges. Two new 2,000,000 gallon double lined basins will be constructed for contaminated cooling water and two existing basins will be used for storm waters.

The treatment plant will be sized for a maximum throughput of 235 gallons per minute. One hundred and sixty five gallons per minute of this throughput will be for process waste waters. The remaining two gallons per minute will be for the cooling water diversions and storm water being held in the basins.

It is necessary from both an environmental and legal standpoint that the project be completed in a expeditious manner. Hazardous contaminants have already been detected in down gradient ground water monitoring wells near the basins. The continued use of the basins could result in further migration of this material and its eventual entry into the water table. Further, failure to achieve the "Hazardous and Solid Waste Amendments of 1986" mandated schedule for closure of the basins would be a clear violation of Federal law.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Effluent treatment facility
Savannah River, South Carolina

2. Project No. 86-D-154

9. Purpose, Justification of Need for, and Scope of Project: (Continued)

The funding profile shown is the minimum necessary to achieve the November 1988 deadline for closure of the basins. Fiscal year 1987 funds will be used for completion of design and procurement, and to initiate construction.

10. Details of Cost Estimate d/

		Item Cost	Total Cost
A. Engineering design at approximately 11% of Item B			$ 4,500
B. Construction Costs			39,800
1) Improvements to Land Includes service roads, parking areas, fencing, lighting, stripping, backfill, topsoil, seed and landscaping		$ 1,765	
2) Buildings		1,930	
3) Special Facilities		33,455	
a) Equipment	13,760		
b) Storage Basins	2,500		
c) Piping, Ductwork and Insulation	11,345		
d) Instruments	2,975		
e) Electrical	2,875		
4) Utilities		$ 2,650	
C. Removal costs			200
Subtotal (Items A&B&C)			$ 44,500
D. Contingencies at approximately 10% of above costs			4,500
E. Design and construction liaison, testing, checkout and acceptance			1,000
Total Estimated Costs			$ 50,000

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d/ Based on completed conceptual design. Currently being updated to reflect subsequent design development.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Effluent treatment facility
Savannah River, South Carolina

2. Project No. 86-D-154

11. Method of Performance:

Design will be performed by a subcontractor. Construction and procurement will be accomplished by the operating contractor, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1986	FY 1986 Reprogramming	FY 1987	FY 1988	FY 1989	Total
A. Total Project Funding							
1) Total Facility Costs							
a) Construction Line Item	$ 0	$ 2,500	$ 3,950	$12,500	$19,250	$11,850	$50,000
b) PE&D	0	0	0	0	0	0	0
c) Expense Funded Equipment	0	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0	0
Total Facility Costs	$ 0	$ 2,500	$ 3,900	$12,500	$19,250	$11,850	$50,000
2) Other Project Funding							
a) R&D necessary to complete construction	$ 6,500	$ 2,000	$ 0	$ 0	$ 0	$ 0	$ 8,500
b) Conceptual design	1,010	350	0	100	100	100	1,660
c) Other project related costs	900	1,500	0	3,000	2,000	2,000	9,400
Total other Project Funding	$ 8,410	$ 3,850	$ 0	$ 3,100	$ 2,100	$ 2,100	$19,560
Total Project Funding	$ 8,410	$ 6,350	$ 3,900	$15,600	$21,350	$13,950	$69,560

B. Total Related Funding Requirement (estimated life of project is 30 years) e/

1) Facility Operating Costs	$6,260
2) Programmatic operating expenses directly related to the facility	0
3) Capital equipment not related to construction but related to the programmatic effort in the facility	60
4) GPP or other construction related to programmatic effort in the facility	0
Total other related annual funding requirements	$6,320

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e/ Annual cost in FY 86 dollars.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Effluent treatment facility
Savannah River, South Carolina

2. Project No. 86-D-154

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding
   1) Total Facility Costs
      a. Construction Line Item - No narrative required.
      b. PE&D - None
      c. Expense Funded Equipment - None
      d. Inventories - None
   2) Other Project Funding
      a. R&D necessary to complete construction - provides for development and testing of effluent treatment processes including reverse osmosis, ultrafiltration, and ion exchange
      b. Conceptual design - Includes engineering studies, wastewater characterization, soil analysis, preparation of cost estimates, and improving equipment design.
      c. Other project related costs--Plant liaison prior to authorization and operation of pilot scale units after design--is complete for process optimization, development of procedures, and operator training..

B. Total Related Funding Requirements
   1) Facility Operating Costs - This project will require additional personnel (26 operating and support personnel) to operate on a 7-day, 4-shift schedule; plus annual expenditures for energy and raw materials.
   2) Programmatic Operating Expenses Directly Related to the Facility - None
   3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the facility - Includes replacement of pumps, filters, etc.
   4) GPP or other Construction Related to Programmatic Effort - None.
   5) Other Costs - None

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Plantwide safeguards systems, Savannah River, South Carolina

2. Project No.: 86-D-156

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3. Date A-E initiated: 1st Qtr. FY 1986

3a. Date physical construction starts: 4th Qtr. FY 1986

4. Date construction ends: 1st Qtr. FY 1990

5. Previous cost estimate: $50,000
Less amount for PE&D: 0
Net cost estimate: $50,000
Date: 5/84

6. Current cost estimate: $50,000
Less amount for PE&D: 0
Net cost estimate: $50,000
Date: 5/85

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	3,000	3,000	3,000	1,000
1986 Sequestered	0	(290)	(290)	(100)
1987	13,610	13,900	13,900	9,200
1988	16,790	16,790	16,790	19,200
1989	9,300	9,300	9,300	12,900
1990	7,300	7,300	7,300	7,800

8. Brief Physical Description of Project

This project provides plantwide safeguards upgrades in the broad areas of physical security alarm systems, personnel/vehicle access controls, and Special Nuclear Materials (SNM) accountability. Specific subprojects are described below:

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Plantwide safeguards systems
Savannah River, South Carolina

2. Project No.: 86-D-156

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8. Brief Physical Description of Project (Cont'd)

A. Security Control and Alarm Center (CAC)

A new CAC (approximately 4,500 sq. ft.) will be constructed. The CAC shall include state-of-the-art alarm monitoring equipment with remotely located redundant security computers, automated closed circuit television (CCTV) surveillance systems, communications, and remote personnel access control capability with historical files. High system reliability will be provided by installing redundant alarm monitoring hardware. Access control hardware will be installed in selected security locations within the 300/700 Area. After installation of the new CAC, equipment within the existing obsolete CAC will be removed.

B. Emergency Management Center (EMC) [a]

An Emergency Management Center (EMC) will be constructed within the 300/700 Area. The EMC (approximately 12,400 sq. ft.) shall contain a Plantwide Alternate Alarm Center (PAAC) and an expanded Emergency Operations Center (EOC). The PAAC will contain redundant equipment as backup to the alarm monitoring capability of the CAC's in the reactor areas and in H, F, and 300/700 Areas. Tie-ins to existing high speed communications channels will provide data links between the EMC and each remote CAC. The EOC portion of the EMC shall contain communications and information management and display systems necessary for plant management to handle any site emergency. This includes coordination functions with DOE, plant operations, and local, federal, and state agencies.

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[a] Replaces Plantwide Alternate Alarm Center previously listed as subproject.

1. Title and location of project: Plantwide safeguards systems
Savannah River, South Carolina

2. Project No.: 86-D-156

8. Brief Physical Description of Project (Cont'd)

C. Entry Control Facilities

New entry control lanes and card readers will be installed within the front entrance lobby of the main Administration Building (703-A). An entry control building of approximately 2,600 sq. ft. will be installed at the rear access control point of the building.

D. Plantwide Access Enrollment System [b/]

A computerized Plantwide Access Enrollment System (PAES) will be installed within an approximately 1,300 sq. ft. addition to the Visitor Control Section (VCS), Building 703-A. The PAES will include computers, files, and other equipment necessary to register personnel into the new plantwide entry control system. Enrollment stations will be installed at several site locations. After authorization, enrolled personnel data will be automatically downloaded to the proper area Control and Alarm Center (CAC) access control file. All data transmissions will be encoded.

E. Special Nuclear Materials Monitors

Monitors will be installed in multiple plant production areas to survey solid waste trash (i.e., cloth wipes, paper, gloves, etc.) which may contain very low level radioactive contamination. This low level waste is stored in cardboard boxes prior to transport from a production area. The waste monitors will provide a go, no-go decision for the transport of boxed waste out of a production area and provide additional assurance that Special Nuclear Material does not exit a production facility via trash waste processing.

F. Accountability Instrumentation

High accuracy specific gravity and level instrumentation will be installed within tanks at the product feed (input) end of the Separations Building 221-F, B-Line, plutonium production facility. Mixing pumps and process measurement instrumentation will be provided. Readouts will be provided within the existing control room. Existing tank instrumentation will be removed.

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b/ New subproject.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project:	Plantwide safeguards systems Savannah River, South Carolina	2. Project No.: 86-D-156

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9. Purpose Justification of Need for, and Scope of Project

The purpose of this project is to provide upgraded Savannah River Plant (SRP) safeguards systems to meet specific requirements and performance standards specified in DOE Order 5632.2, DOE Order 5632 (Draft), DOE Site Order 563X.5 for the protection of SNM, and increased requirements for more accurate accountability of SNM.

Recent increases in the perceived threat level to DOE facilities have resulted in increased security measures and increased performance requirements for security CAC's. The new 300/700 Area CAC and equipment will accomplish the security performance upgrades required for the 300/700 Area. The existing 300/700 Area CAC system cannot be effectively expanded or enhanced to meet these new requirements; and therefore, it must be replaced. Existing CAC's in the Reactor Areas (C, P, K, and L) are presently being replaced/upgraded under Project 82-D-127. Existing CAC's in F and H Separations Areas will be replaced utilizing funding under Project 84-D-134 in order to provide alarm point capacity to meet immediate needs for security projects already scheduled within these areas.

DOE Orders 5632.2 and 5632 (draft) establish the requirement for an alternate alarm center to provide a separate indication of alarms and to initiate a response in the event of incapacitation of the primary alarm center (CAC). The Emergency Management Center (EMC) will provide a redundant and independent alarm monitoring and response initiation capability for each CAC in C, P, K, L, H, F, and the 300/700 Areas. In the event of incapacitation of any CAC, the EMC will be able to direct security response forces. The EMC system will use software cross-checks to monitor the responses of CAC operators for abnormal conditions. A plantwide overview of SRP's security status will be maintained in the EMC. The EMC will have communications facilities to security forces, Department of Energy, plant management, and specified state and local agencies. The EMC concept is to greatly reduce the probability that a single act will eliminate the capability to monitor the status of SNM protection systems.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Plantwide safeguards systems
Savannah River, South Carolina

2. Project No.: 86-D-156

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9. Purpose Justification of Need for, and Scope of Project (Cont'd)

Expansion of the Emergency Operations Center (EOC) as part of the EMC facility is required to effectively coordinate security and operational requirements with the greatly increased regulatory and statutory interface requirements with DOE and local, state, and federal agencies. The integration of security (PAAC) and traditional EOC functions into the EMC is deemed imperative in the overall objective of maintaining a safe nuclear production environment and protecting the public welfare.

Improved equipment for boxed waste monitoring is needed in production facilities on a plantwide basis. Commercial analyzer electronics are available to perform the counting/assay task; however, the equipment is not packaged and integrated with physical security controls to function as a stand-alone unit. An integrated monitoring system must be developed. After assay and clearance for transport, the monitor must also transfer the boxed waste through the security barrier wall without compromising the physical integrity of the wall.

The proposed Separations Building 221-F, B-Line instrumentation is required to provide a more accurate estimate of plutonium (SNM) received into the B-Line process from the canyon process. These improved measurements combined with other upgraded SNM input/output measurements will increase the overall accuracy of Savannah River Plant's SNM accountability program.

1. Title and location of project: Plantwide safeguards systems
Savannah River, South Carolina

2. Project No.: 86-D-156

10. Details of Cost Estimate [c/]

Item			Item Cost	Total Cost
A. Engineering, inspection, and design at approximately 33% of construction costs, Item B				$ 9,700 [d/]
B. Construction costs				29,100
1) Improvements to land including roads, walks, fences, excavation grading, landscaping, erosion, and backfill			$ 100	
2) Buildings			5,000	
a. 300/700 area control and alarm center (4,500 SF)		$1,100		
b. Entry control fac. bldg. 703-A admin area (1,800 SF)		500		
c. Building 703-A addition, VCS enrollment system (1,300 SF)		170		
d. Emergency management center (12,400 SF) (Excl. renovations to building 703-A, A and B wings)		3,000		
e. Boxed waste handling fac., bldg. 326-M (1,800 SF)		230		
3) Special facilities			23,400	
a. H&V equipment		1,400		
b. Mechanical equipment		680		
c. Electrical equipment		3,370		
d. Security systems		12,200		
e. ADP computer systems		5,750		
o 3/700 area ADP system	$1,650			
o Emergency management center ADP system	3,300			
o Access enrollment ADP system	800			
4) Utilities			600	
C. Removal costs				3,300
Subtotal				42,100
D. Contingency at approximately 18% of above cost				7,400
E. Allowance for design and construction liaison, testing, checkout, and acceptance				500
Total project cost				$ 50,000

[c/] The above estimates are based on completed conceptual design.

[d/] Computerized security and access control systems requiring significant detailed engineering design effort and software development.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Plantwide safeguards systems
Savannah River, South Carolina

2. Project No.: 86-D-156

11. Method of Performance

Design will be performed by both the operating contractor and negotiated architect-engineer contracts. Construction and procurement will be accomplished by the operating contractors, utilizing fixed-price subcontractors awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

A. Total project costs	Prior Years	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	Total
1) Total facility costs								
a. Construction line item...............	$ 0	$ 0	$ 900	$ 9,200	$19,200	$12,900	$ 7,800	$50,000
b. Plant engineering and design (PE&D)..	0	0	0	0	0	0	0	0
c. Expense funded equipment.............	0	0	0	0	0	0	0	0
d. Inventories..........................	0	0	0	0	0	0	0	0
Total facility costs..........................	$ 0	$ 0	$ 900	$ 9,200	$19,200	$12,900	$ 7,800	$50,000
2) Other project costs								
a. R&D necessary to complete construction.......................	$ 0	$ 300	$ 300	$ 0	$ 0	$ 0	$ 0	$ 600
b. Conceptual design....................	0	900	0	0	0	0	0	900
c. Other project related costs..........	0	210	2,760	0	0	800	200	3,970
Total other project costs................	$ 0	$1,410	$ 3,060	$ 0	$ 0	$ 800	$ 200	$ 5,470
Total project costs (Items 1 and 2)........................	$ 0	$1,410	$ 3,960	$ 9,200	$19,200	$13,700	$ 8,000	$55,470

B. Total related cost requirements (estimated life of project - 20 years)

	Annual Cost
1) Facility operating costs..	$1,500
2) Programmatic operating expenses directly related to the facility........................	0
3) Capital equipment not related to construction but related to the programmatic effort in the facility...	0
4) GPP or other construction related to the programmatic effort in the facility...........	0
5) Other costs..	0
Total other related annual cost requirements..	$1,500

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Plantwide safeguards systems
Savannah River, South Carolina

2. Project No.: 86-D-156

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total project costs
  1. Total facility costs
    a. Construction line item - No narrative required.
    b. Plant Engineering and Design (PE&D) - None
    c. Expense funded equipment - None
    d. Inventories - None
  2. Other project costs
    a. R&D necessary to complete construction - Experimental boxed waste monitors must be developed and tested prior to specifying project equipment.
    b. Conceptual design - Includes funds to prepare cost estimates.
    c. Preliminary engineering studies and preliminary design in preparation for project authorization. Development of some specialized security system software and computer system planning documentation in preparation for project authorization. Checkout of computer system installation.

B. Total related cost requirements

These costs are associated with the following additional requirements:
- Three new security posts associated with operation of security facilities.
- Annual security system maintenance costs.
- Utility and supply costs for operating the new facilities.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Hydrofluorination system - FB-Line
Savannah River, South Carolina

2. Project No. 86-D-157

3. Date A-E work initiated: 3rd Qtr. FY 1986

3a. Date physical construction starts: 2nd Qtr. FY 1987

4. Date construction ends: 2nd Qtr. FY 1989

5. Previous cost estimate: $10,000
Date: 1/84

6. Current cost estimate: $ 9,200 a/
Date: 6/85

7. Financial Schedule

Fiscal Year	Authorization	Appropriation	Obligations	Costs
1986	$ 2,200	$ 2,200	$ 2,200	$ 750
1986 Sequestered	0	(200)	(200)	(70)
1987	2,310	2,510	2,510	3,120
1988	2,950	2,950	2,950	3,200
1989	1,740	1,740	1,740	2,200

8. Brief Physical Description of Project

This project will provide facilities to hydrofluorinate PuO_2 to PuF_4 using existing and planned M-9 process furnaces in the Separations FB-Line Plutonium Finishing Facility. Specific scope elements of the project are:

- o A new anhydrous hydrogen fluoride (HF) feed gas facility containing two banks of HF cylinders, with remote control valving, and a gas scrubbing system.
- o Modifications to the M-9 roasting furnace including an additional HF feed line, automatic feed controls and an enclosure for the HF feed control valves.
- o Construction of an off-gas scrubbing system including:
  - -A stainless steel lined equipment enclosure room.
  - -KOH scrubber tanks and pumps.
  - -Vacuum exhausters and heat exchangers.
  - -A KOH make-up tank and pump.

All work will be located within or adjacent to the existing FB-Line facility. FY 1987 funds will be used to begin construction and continue procurement and design.

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a/ Reflects reduced escalation forecast.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Hydrofluorination system - FB-Line
Savannah River, South Carolina

2. Project No. 86-D-157

9. Purpose, Justification and Need for, and Scope of Project

Hydrofluorination facilities in the FB-Line will provide capability for handling clean plutonium oxide feed in the FB-Line without dissolution or canyon processing and reduce personnel radiation exposure. It will further provide greater DOE system-wide versatility for processing plutonium scrap and residues by providing a method for relieving the new Special Plutonium Recovery Facility from processing high grade oxide feed, thus allowing it to be utilized for processing slower, leaner plutonium residues. These facilities will include a hydrogen fluoride feed gas system, an off-gas scrubbing system, and special equipment, (e.g. hydrofluorination pans).

The objectives of this project are:

- Provide a near direct route for converting purified PuO_2 to weapons grade material. Hydrogen fluoride is used to convert PuO_2 to a PuF_4/PuO_2 mixture suitable for calcium reduction to plutonium metal. This would free recovery processing routes to handle more difficult to process material.
- Reduce FB-Line personnel radiation exposure by approximately 40% per unit of material processed by bypassing special recovery, canyon, and FB-Line wet chemistry operations.
- Provide the FB-Line with the option of converting to an oxalate precipitation/hydrofluorination flowsheet with a resulting 90% and 50% reduction in neutron emissions at the precipitators and conversion furnaces, respectively.

10. Details of Cost Estimate [b/]

		Item Cost	Total Cost
A. Engineering design at 35% of construction costs			$ 1,900
B. Construction costs			5,370
1) Building		$ 220	
2) Special Facilities		5,150	
a) Equipment	$1,730		
b) Piping	1,170		
c) Electrical	430		
d) Instruments	1,820		
C. Removal and maintaining production costs			250
Subtotal (Items A, B, and C)			$ 7,520

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b/ This estimate is based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: Hydrofluorination system - FB-Line
Savannah River, South Carolina

2. Project No. 86-D-157

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10. Details of Cost Estimate (Con'd)

D. Contingencies at approximately 19% of above costs ..	$ 1,430
E. Design and construction liaison, testing checkout and acceptance	$ 250
Total Estimated Cost	$ 9,200

11. Method of Performance

Design will be performed by the operating contractor. Construction and procurement will be accomplished by the operating contractor, utilizing fixed-price subcontractors awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1986	FY 1987	FY 1988	FY 1989	TOTAL
A. Total project costs						
1) Total facility costs						
a) Construction line item	$ 0	$ 680	$ 3,120	$ 3,200	$ 2,200	$ 9,200
b) PE&D	0	0	0	0	0	0
c) Expense funded equipment	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0
Total facility costs	0	$ 680	$ 3,120	$ 3,200	$ 2,200	$ 9,200
2) Other project costs						
a) R&D	$ 2,200	$ 420	$ 400	$ 280	$ 150	$ 3,450
b) Other project related cost	0	0	0	0	0	0
Total Other Project Costs	$ 2,200	$ 420	$ 400	$ 280	$ 150	$ 3,450
Total Project Costs	$ 2,200	$ 1,100	$ 3,520	$ 3,480	$ 2,350	$12,650

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: Hydrofluorination system - FB-Line
Savannah River, South Carolina

2. Project No. 86-D-157

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12. Funding Schedule of Project Funding and Other Related Funding Requirements (Cont'd)

B. Other Related Annual Costs (estimated life of project is 20 years)

	Annual Cost
1) Facility Operating Costs	$ 0
2) Programmatic Operating Expense Directly Related to the Facility	0
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	7
4) GPP or other Construction Related to the Programmatic Effort in the Facility	7
5) Other Costs	0
Total Related Annual Costs	$ 14

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total project funding
  1. Total facility costs
    a) Construction line item - No narrative required.
    b) PE&D - None.
    c) Expense funded equipment - None.
    d) Inventories - None.

  2. Other project costs

    a) R&D - Includes $775,000 for conceptual design and engineering studies.
    b) Other projected related costs - none.

B. Total related funding requirements:
  1. Facility operating costs - This project provides a process to bypass some current FB-Line operations. Operating and supporting staff, and materials and energy requirements are essentially unchanged.
  2. Programmatic operating expenses directly related to the facility - None.
  3. Capital equipment not related to construction but related to the programmatic effort in the facility - Estimated cost to replace capital equipment such as pumps and instruments.
  4. GPP or other construction related to programmatic effort in the facility - Cost to update or improve items.
  5. Other costs - None.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars)

1. Title and location of project: Fuel Processing Restoration, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 85-D-139

3. Date A-E work initiated: 2nd Qtr. FY 1985

3a. Date physical construction starts: 1st Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1992

5. Previous cost estimate: $270,000
Date: 12/84

6. Current cost estimate: $270,000
Less amount for PE&D: 0
Net cost estimate $270,000
Date: 12/85

7. Financial Schedule:

FISCAL YEAR	AUTHORIZATIONS	APPROPRIATIONS	OBLIGATIONS	COSTS
1985	$ 10,000 a/	$ 10,000a/	$ 10,000a/	$ 8,200
1986	12,000	15,000	15,000	13,000
1986 Sequestered	0	(1,470)	(1,470)	(1,470)
1987	36,530	35,000	35,000	20,780
1988	71,470	71,470	71,470	46,470
1989	65,000	65,000	65,000	60,000
1990	60,000	60,000	60,000	55,000
1991	15,000	15,000	15,000	40,000
1992	0	0	0	28,000

8. Brief Physical Description of Project:

The Idaho Fuels Processing Facility (IFPF) supports the nation's defense by processing Naval nuclear propulsion fuels and thus closes the Navy's fuel cycle while providing fuel for the Department of Energy's production reactors. The Navy has forecasted a 40-year mission for the IFPF which will increase its base processing load substantially beyond present capacity.

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a/ Limited to design activities only.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Restoration, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho	2. Project No. 85-D-139

8. Brief Physical Description of Project: (continued)

The Fuel Processing Restoration (FPR) project will replace portions of the deteriorated main processing facility solvent extraction systems with new facilities and process systems that will meet current codes and standards, and the demands of projected fuel processing loads. The resulting facilities will be designed to provide a minimum recovery rate of Uranium-235 per day to meet requirements, be capable of concurrent or sequential uranium recovery operation, have adequate intercycle and product storage or surge capacity to support concurrent or sequential modes, minimize personnel radiation exposures, minimize the spread of radioactive and chemical contamination, improve criticality safety, increase process availability, and minimize the release of radioactive effluents to the environment. The project will provide remote maintenance/replacement capabilities in those portions of the solvent extraction process which, due to high radiation hazards, decontamination time, and historically high maintenance requirements, cannot otherwise achieve the required process availability. Finally, the project will reduce the volume of liquid service waste water disposed of by means of the percolation ponds. After the FPR Project is completed, an alternate disposal system will receive a reduced volume of cleaner (i.e., less contaminated chemically and radiologically) effluent from the recycle and cleanup systems of the IFPF provided by the FPR project.

All new facilities, structures, and process cells provided by this project will be constructed of reinforced concrete, and will be arranged by process function. New cells will be designed to be compatible with existing cells (e.g., isolated and below grade); and constructed to optimize material flows, provide ready but controlled personnel access, optimize remote handling and maintenance capabilities, minimize overall floor area, and meet all credible natural phenomena design requirements. As necessary, the new facilities and process systems will include supporting systems including control rooms and control stations, health physics offices, electrical switchgear, maintenance areas, process make-up areas, chemical storage areas, overhead bridge cranes and bridge-mounted manipulators. Additional cells and specified areas will also be provided for radioactive liquid waste handling systems, process and ventilation air supply and exhaust systems, and process sampling. A combination of remote and direct maintenance techniques will be employed in the new facilities. Direct maintenance equipment/areas will be limited to pipes, columns, tanks, and similar items not expected to require maintenance or replacement for many years. Remote maintenance/replacement will be provided for failure-prone items to aid in

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Fuel Processing Restoration, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho	2. Project No. 85-D-139

8. Brief Physical Description of Project: (continued)

decontamination, replacement, and maintenance activities, thereby decreasing process down time, facility and process decontamination time, liquid and solid waste generation rates, and needless personnel radiation exposures. Remote maintenance areas will be provided with shielding windows for direct viewing; manipulators for remote handling and maintenance; and ports and hatches for access, TV viewing, the introduction of tools and specified equipment, and replacement of major items of equipment.

All efforts related to this project will incorporate the latest proven engineering and technology to ensure process reliability and availability, minimize the release of radioactive and chemical effluents to the environment, minimize personnel radiation exposure, ensure criticality safety, increase throughput capacity, and improve solvent recovery capability. The entire process will incorporate improved security and safeguards systems and improved sampling and accountability provisions.

The budget authority level requested in FY 1987 of $35 million is for the continuation of definitive design activities and long-lead equipment procurement activities and the initiation of construction activities.

9. Purpose, Justification of Need for, and Scope of Project:

The IFPF was designed and built in the early 1950's to demonstrate fuel processing technologies and to support DOE's Nuclear Materials Production Program. Using the techniques and standards existing at that time, the plant was built as a 5-year demonstration facility. However, it has operated successfully for 30 years as a production facility. Over the plant's operating years, many modifications and additions have been made to provide a facility capable of safely meeting DOE's fuel processing needs. As a result, the plant continues to operate in a manner that ensures safety to plant personnel and the public.

However, today's philosophy encourages: (a) further reductions in personnel radiation exposures to as-low-as-reasonably-achievable (ALARA) levels; (b) physical rather than administrative methods of preventing criticality; (c) improved cleanup and control of effluent releases; and (d) more intensified security and product accountability measures. In addition to these changes in philosophy, the most recent IFPF fuel receiving forecasts indicate IFPF's operating mission extending to at least the year 2028. These forecasts project not only a longer plant operating mission, but also dramatic increases in the plant's future fuel processing requirements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Restoration, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho	2. Project No. 85-D-139

9. Purpose, Justification of Need for, and Scope of Project: (continued)

To enable the IFPF to meet its identified mission, seven improvement objectives that the IFPF process systems and facilities must meet have been defined: (1) provide safe and timely uranium recovery operations; (2) provide reduced criticality risks for long-term uranium recovery operations; (3) provide features that achieve as-low-as-reasonably-achievable (ALARA) radiation exposure to plant personnel; (4) provide fuel recovery structures, systems, and equipment that meet applicable natural phenomena standards, codes, and safety criteria; (5) provide systems to maintain radioactive and chemical releases to the environment at or below acceptable limits; (6) provide enhanced safeguards and security systems; and (7) provide flexible fuel processing capability. Recently, several IFPF processes have been replaced with new facilities and systems that meet these seven mission and improvement objectives. For example, the new FLUORINEL Dissolution and Storage Facility (Project 77-13-a) will provide the facilities and systems needed to meet projected fuel receiving, storage, and dissolution requirements. The recently commissioned New Waste Calcining Facility (NWCF) provides systems to safely solidify radioactive wastes. However, for the uranium recovery process systems and facilities between dissolution and calcination, little work has been performed to provide a long-term, highly reliable capability to recover uranium from dissolved irradiated fuels.

Past IFPF practice has also included the disposal of large volumes (approximately 3,000,000 gallons per day) of service waste liquids to the aquifer through an IFPF injection well. The discharged liquids are normally relatively clean, but do contain small amounts of both chemical and radioactive waste. In the event of a "worst case" failure such as a process system heat exchanger tube failure, gross amounts of radioactive liquids could be discharged to the percolation ponds, which were recently constructed to eliminate the need for the injection well.

The FPR project will include recycle or closed loop water cooling systems, chemical treatment and recycle systems, and effluent regeneration and reuse systems. Through these measures and systems, essentially all liquid effluent streams will be cleaned up, recycled, or reused to eliminate the need for the percolation ponds to dispose of liquid effluents. These systems will become an integral part of the FPR and will be designed and sized to integrate with other IFPF operating systems and facilities as well as the FPR.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Restoration, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 85-D-139

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9. Purpose, Justification of Need for, and Scope of Project: (continued)

To correct the problems and conditions identified, the FPR project, with state-of-the-art engineering, would provide systems, facilities, and features that meet today's codes, standards, and requirements. Implementation of the FPR project is expected to yield significant savings in several areas including: (1) a reduction in personnel radiation exposures of approximately 70 man-rem/yr, (2) a reduction in major plant shutdowns, (3) a reduction in the volume of contaminated liquid wastes generated, and (4) a decrease of several hundred minor miscellaneous contamination incidents per year. For the IFPF to meet its improvement objectives and its defined operating mission, the FPR project is vitally needed to provide the necessary operating continuity and process reliability. A delay in the initiation of construction activities on the FPR project beyond FY 1987 would be costly in terms of the reduced amount of uranium processed; the increase in the number and extent of personnel radiation exposures; the increase in volume of decontamination and clean-up wastes generated; the increase in operating costs; and the increase in the project cost.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Restoration, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho	2. Project No. 85-D-139

10. Details of Cost Estimate: b/

	Item Cost	Total Cost
a. Engineering, design, inspection and project administration costs at approximately 26% of construction costs, item b		$ 47,600
b. Construction costs		183,200
1. Improvements to land including grading, landscaping, drainage diversion, paving and parking	400	
2. Buildings		
(a) Fuel Processing Facility, 140,000 sq. ft. at $336 per sq. ft.	47,100	
3. Other structures		
(a) Exhaust stack	200	
4. Special Facilities		
(a) Process systems equipment; i.e., vessels, valves, pump	15,200	
(b) Process piping	36,000	
(c) Instrumentation: process, HVAC	19,000	
5. Utilities, including electrical power, water, sanitary sewer lines, compressed air, heat and process steam lines, condensate return lines.	22,800	
6. Special equipment, including shielding windows and doors, material handling equipment, major process equipment	37,900	
c. Major computer items include computer and distributed control system		4,200
d. Demolition		400
Subtotal (Items a & b)		230,800
e. Contingency at approximately 17% of above costs		$ 39,200
Total Project Costs		$270,000

11. Method of Performance:

Design will be awarded on the basis of technical evaluation. Construction, and procurement will be accomplished by prime contracts and/or subcontracts awarded on the basis of competitive bidding.

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b/ The above cost estimate is based on a completed advanced Conceptual Design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Restoration, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 85-D-139

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

A. Total project funding	Prior Years	FY1985	FY1986	FY1987	FY1988	FY1989	FY1990	FY1991	FY1992	FY1993	FY1994	Total
(1) Total facility costs												
(a) Construction Line Item	$ 0	$ 9,000	$11,530	$20,000	$46,470	$60,000	$55,000	$47,000	$29,000	$ 0	$ 0	$278,000
(b) PE&D	0	0	0	0	0	0	0	0	0	0	0	0
(c) Expense Funded Equipment	0	0	0	0	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	750	1,200	1,500	400	0	0	0	3,850
Total Facility Costs	$ 0	$ 9,000	$11,530	$20,000	$47,220	$61,200	$56,500	$47,400	$29,000	$ 0	$ 0	$281,850
(2) Other Project Funding												
(a) R&D Necessary to Complete Construction	$12,604	$ 2,215	$ 850	$ 400	$ 200	$ 50	$ 0	$ 0	$ 0	$ 0	$ 0	$ 16,319
(b) Other Project Related Costs	0	2,430	3,180	4,770	5,440	5,815	5,370	6,600	7,540	$10,150	$ 9,330	60,625
Total Other Project Funding	12,604	4,645	4,030	5,170	5,640	5,865	5,370	6,600	7,540	$10,150	$ 9,330	76,944
Total Project Funding	$12,604	$ 13,645	$15,560	$25,170	$52,860	$67,065	$61,870	$54,000	$36,540	$10,150	$ 9,330	$358,794

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Restoration, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 85-D-139

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (continued)

B. Total Related Funding Requirements: (Estimated Life of Project: 40 years) [c]

1. Facility Operating Costs	$ 0/year
2. Programmatic Operating Expenses Directly Related to the Facility	$ 0
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	$ 0
4. GPP or Other Construction Related to Programmatic Effort in the Facility	$ 0
Total Related Annual Funding Requirements	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

A. Total Project Funding

1. Total Facility Costs

a. Construction Line Item - No narrative required
b. PE&D - No narrative required
c. Expense Funded Equipment - No narrative required
d. Inventories - The FPR inventories will include uninstalled and replacement spares of pumps, motors, valves, blowers, etc., that will be needed to insure a successful facility startup and cold operation.

2. Other Project Funding

a. R&D necessary to complete construction - Approximately $1,400,000 was expended on equipment and process research and development (R&D) activities in prior years. An additional $3,715,000 will be needed to support the remaining R&D in FY 1985 through FY 1989. Through FY 1984, approximately $11,204,000 was spent on the preconceptual, conceptual, and advanced conceptual design efforts.

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[c] Operating costs and programmatic costs for the restored facility will not change from that presently budgeted for the existing processing facility.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Restoration, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 85-D-139

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements: (continued)

b. Other Project Related Costs - Approximately $60,780,000 will be spent on project support (project engineering, design review, documentation, etc.), operator training and facility startup. Project support will extend through design, construction, and startup.

8. Total Related Funding Requirements

No incremental change in funding is required for programmatic operation of the restored facility.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative in whole dollars.)

1. Title and location of project: Productivity and radiological improvements, Feed Materials Production Center, Fernald, Ohio
2. Project No. 85-D-140

3. Date A-E work initiated: 2nd Qtr. FY 1985
3a. Date physical construction starts: 4th Qtr. FY 1985
4. Date construction ends: 2nd Qtr. FY 1989

5. Previous cost estimate: $47,000
Date: 8/83
6. Current cost estimate: $47,000
Less amount for PE&D: 0
Net cost estimate: $47,000
Date: 12/85

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$ 6,000	$ 3,000	$ 3,000	$ 788
1986	12,000	15,000	15,000	12,000
1987	23,500	23,500	23,500	22,500
1988	5,500	5,500	5,500	10,712
1989	0	0	0	1,000

8. Brief Physical Description of Project [a]

This project provides for the replacement of equipment and systems to assure continued and safe operation of the Department of Energy's Feed Materials Production Center at Fernald, Ohio. This includes:

Plant	Description
2	Improved slag leach filtration and vacuum system relocated in the digestion area.
2	Improved method of loading, ventilation, and instrumentation for the metal dissolver.
3	Revisions to the UO3 gulping, milling, sampling and packaging systems relocated in the digestion area.
4	Environmental and safety improvements for the Tank Farm.

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[a] Previously indicated improvements to the column digesters, refinery instrumentation, feed controls and conveyors, and materials handling between Plants 4 & 5 have been deleted.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Productivity and radiological safety improvements, Feed Materials Production Center, Fernald, Ohio

2. Project No. 85-D-140

8. Brief Physical Description of Project (cont'd)

4	Redesign and replacement of Fluid Bed Furnaces.
4	Modification to the HF off-gas system and the HF recovery system replacement.
5	Upgrade "F" machines
8	New oxidation furnaces for residues of 3 to 4% U-235, upgrade existing furnace for 1.25% U-235, replacement of a box furnace, and a mid-size mill.
8	Replace and upgrade rotary kiln.
Plantwide	Stack monitoring systems.
1	New drum reconditioning system and uranium control pad.

FY 1987 funds will be used to continue procurement and construction.

9. Purpose, Justification of Need for, and Scope of Project

Equipment and safety improvements are required at the Feed Materials Production Center (FMPC) to ensure the continued capacity to meet programmatic needs and increasingly stringent radiological and industrial safety requirements. The FMPC produces depleted and slightly enriched uranium for the nuclear material production reactors. The plant was built in the early 1950's and has had no substantial physical or technological renovation since that time. Consequently, it is becoming obsolete in areas such as control systems, power supplies, materials handling, and environment controls.

Much of the instrumentation for process control is outdated. Reliable instrumentation is essential for proper operation monitoring and for immediate detection of inadvertent uranium releases. New electronic systems with servomechanisms are required, particularly for the extraction process. Similarly, the ducting for the present UO3 packaging system is such that dust losses sometimes occur and become airborne at transition sections between system components. Upgrading of the UO3 handling system is required to assure product quality and to maintain ALARA levels for operating personnel.

Some basic process steps also need to be changed. For example, certain uranium residues can not currently be digested in nitric acid without excessive fuming and/or foaming. A more versatile digester will be provided which will overcome the fuming/foaming Nox problems by restricting the feed and acid quantities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Productivity and radiological safety improvements, Feed Materials Production Center, Fernald, Ohio

2. Project No. 85-D-140

10. Details of Cost Estimate a/

	Item Cost	Total Cost
A. Engineering, design, and inspection costs for Titles I, II and III at approximately 20% of Item B.		$ 6,500
B. Construction Costs		31,100
1) Building modifications	$ 700	
2) Special facilities	21,100	
3) Other structures	9,300	
Subtotal		37,600
C. Contingency @ approximately 25% of above cost		9,400
Total Estimated Cost		$47,000

11. Method of Performance

Design and inspection will be performed with a negotiated architect-engineer contract. To the extend feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

A. Total Project Funding

	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	Total
1. Total Facility Costs							
a) Construction line item..	$ 0	$ 788	$12,000	$22,500	$10,712	$ 1,000	$47,000
b) PE&D	0	0	0	0	0	0	0
c) Expense funded equipment	0	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0	0
Total Facility Costs ...	$ 0	$ 788	$12,000	$22,500	$10,712	$ 1,000	$47,000
2. Other Project Funding							
a) R&D necessary to complete construction	$ 861	$ 64	$ 0	$ 0	$ 0	$ 0	$ 925
b) Other project related costs	0	0	0	0	0	0	0
Total Other Project Funding..	861	64	0	0	0	0	925
Total Project Funding........	$ 861	$ 852	$12,000	$22,500	$10,712	$ 1,000	$47,925

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a/ Based on completed conceptual design

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Productivity and radiological safety improvements, Feed Materials Production Center, Fernald, Ohio

2. Project No. 85-D-140

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12. Funding Schedule of Project Funding and Other Related Funding Requirements (Cont'd)

B. Total Related Funding Requirement (estimated life of projects: 10 years)

1) Facility Operating Costs	0
2) Programmatic Operating Expenses Directly Related to the Facility	0
3) Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	0
4) GPP or Other Construction Related to Programmatic Effort in the Facility	0
5) Other Costs	0
Total Other Related Annual Funding Requirements	0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding
- 1) Total Project Costs
  - a) Construction line items funding - No narrative required
  - b) PE&D funding - None
  - c) Expense funded equipment - None
  - d) Inventories - None

- 2) Other Project Funding
  - a) R&D necessary to complete - Includes $452,000 developmental costs and $473,000 conceptual design costs.
  - b) Other project related costs - None

B. Total Related Funding Requirements
- 1) Facility Operating Cost - Operating costs will be reduced slightly
- 2) Programmatic Operating Expenses Directly Related to the Facility - No change
- 3) Capitol Equipment not Related to Construction but related to the programmatic effort in the facility - None
- 4) GPP or Other Constructon - None
- 5) Other Costs - None

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Fuel production facility a/
Savannah River, South Carolina

2. Project No. [illegible]

3. Date A-E Work Initiated: 3rd Qtr. FY 1985 d/

3a. Date Physical Construction Starts: 3rd Qtr. FY 1986 d/

4. Date Construction Ends: 4th Qtr. FY 1989 d/

5. Previous Cost Estimate: $ [illegible]
Date: [illegible]

6. Current Cost Estimate: $ [illegible]
Less Amount for PE&D: 0
Net Cost Estimate: $ [illegible]
Date: [illegible]

7. Financial Schedule:

Fiscal Year	Authorization	Appropriation	Obligations	Costs
1985	$ 8,000 b/	$ 5,000 c/	$ 5,000 c/	$ 700
1986	[illegible]	18,000	[illegible]	[illegible]
1987	[illegible]	[illegible]	[illegible]	[illegible]
1988	25,700	25,700	25,700	[illegible]
1989	0	0	0	[illegible]

8. Brief Physical Description of Project:

This project provides a new facility at the Savannah River Plant to recycle enriched uranium and produce uranium oxide-aluminum billets for subsequent extrusion into reactor fuel tubes in a separate facility. The facility will

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a/ New title for combined facility that will be constructed in lieu of separate line items [illegible] and [illegible].
b/ Includes $[illegible] authorized for [illegible] and $[illegible] authorized for [illegible].
c/ Includes $[illegible] appropriated for [illegible] and $[illegible] appropriated for [illegible].
d/ Project delayed awaiting processing and approval of combined scope and to funding constraints.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project:	Fuel production facility Savannah River, South Carolina	7. Project No. 85-D-145

8. Brief Physical Description of Project: (Cont'd)

eliminate the need to ship uranyl nitrate solutions to Oak Ridge Y-12 for reprocessing, and will replace the present SRP process of melting, casting, and machining U-Al metal alloy fuel cores. It will have the capability of converting oralloy, ICPP oxide, and the product of a proposed fuel improvements facility into uranyl nitrate in preparation for U_3O_8 production and will be designed to recycle 16 metric tons of uranium per year and provide fuel cores for four reactors.

This project will include a new 78,000 square foot building, containing a central processing area, a computer based control room, hardened vault, and other necessary service facilities. Approximately 50,000 square feet will be of high resistance construction and 28,000 square feet of standard construction. Ventilation facilities and a stack adequate to serve the building and process exhaust will be provided. Safety systems, including nuclear incident monitors and fire detection-suppression systems, will be installed. Utilities will include water and sewer, electricity, nitrogen supply, oxygen supply, process water, and steam.

Equipment will be provided for preparation and blending of uranyl nitrate feed with dissolved offsite oxide, conversion to U_3O_8 through a chemical/calcination process, grinding of U_3O_8 and blending with aluminum powders, compaction of the blend into fuel billet cores, assembly of cores into aluminum components, and welding of the assembled units before they are transferred to existing facilities for outgassing and extrusion into fuel tubes. Equipment will also be provided for recycle of process liquids, handling of liquid wastes, and treatment of process offgasses. Vault storage will be provided for offsite feed and U_3O_8 intermediate product.

All processing equipment will be housed in secondary enclosures or glove boxes to provide radiation shielding, containment, and filtered ventilation to prevent release of uranium oxide to the environment. The ventilation system will be designed to maintain temperature and humidity conditions necessary for the handling of the oxide and aluminum powders. Material handling equipment will be provided to assist the operators in moving process containers inside the cabinets. A computer system (exceeding $400,000) will be used to control process equipment and maintain an inventory of process materials.

FY 1987 funding will be used to continue construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Fuel production facility
Savannah River, South Carolina

2. Project No. 85-D-145

9. Purpose, Justification of Need for, and Scope of Project:

The conversion of uranyl nitrate to uranium oxide is a principal step in the recovery of enriched uranium from discharged reactor fuel. Recovery of this material is highly cost effective in that over $125 million per year of, otherwise required, feed material and separative work unit costs are avoided.

Conversion operations are presently performed in DOE's Y-12 Plant in Oak Ridge, Tennessee. The Y-12 facilities have been in use since 1959 and have reached the point where they are no longer capable of meeting the demands of continuous service. Existing processing equipment must be replaced and extensive system modifications made to reduce radiation exposure levels and improve nuclear materials accountability.

Cost-benefit analyses indicated that it will be cheaper to construct a new facility and centralize conversion operations at Savannah River than to attempt to upgrade the existing Y-12 facilities. Capital investment requirements will be higher for the new Savannah River facility but this initial outlay will be paid back upon startup through transportation and processing savings.

The construction of a new facility at Savannah River also provides several important benefits. It will allow cessation of over-the-road shipments of uranyl nitrate solution between Savannah River and Oak Ridge, thereby totally eliminating any possibility that a radioactive release could occur due to an in-transit accident or that operations could be halted by a truckers' strike. Under present operating conditions, the Savannah River H Canyon process can be maintained in operation for only a limited period of time if uranyl nitrate shipments are interrupted. It has been necessary to shut down the canyon process four times in the recent past due to such interruptions.

The new powder metallurgy (PM) process will replace the casting and machining process now used to form fuel billet cores from a U-Al metal alloy. PM will reduce fuel manufacturing costs, increase reactor productivity, reduce waste costs, and improve the working environment.

One-time savings at Savannah River include $800,000 in avoided capital in the casting/machining process, and $6,800,000 from fuel assembly redesign costs that would have been required for metal alloy fuel.

Total savings during the initial 20 years of operation are estimated to be $251,000,000 (in 1985 dollars), which includes: $54,000,000 in fuel tube fabrication; $50,000,000 in oxide production; $32,500,000 in avoided shipping expense; $39,400,000 in waste disposal; and $75,400,000 in reduced purchases of 93 percent enriched uranium feed. This equates to an average annual savings of $12,700,000 per year and a rate of return of 25 percent.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project:	Fuel production facility Savannah River, South Carolina	2. Project No. 85-D-145

10. Details of Cost Estimate: d/

	Item Cost	Total Cost
A. Engineering design at approximately 32% of construction costs, Item B		$ 17,130
B. Construction Costs		56,760
1. Site Preparation and Support Facilities............	$ 9,470	
2. Manufacturing Building	6,700	
3. Building H&V and Other Equipment	9,000	
4. Uranium recycle line for production of U_3O_8	22,170	
5. Powder metallurgy line for core production	4,150	
6. Security and safeguards measures, including accountability	5,270	
C. Removal cost		610
Subtotal		74,500
D. Contingencies at approximately 17% of above costs		8,000
E. Design & construction liaison, testing, checkout and acceptance		2,500
Total project cost		$ 85,000

11. Method of Performance:

Design will be by the operating contractor. Construction and procurement will be by the operating contractor utilizing, to the extent feasible, fixed-price subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

A. Total project costs	Prior Years	FY85	FY86	FY87	FY88	FY89	TOTAL
1) Total facility costs							
a. Construction Line Item...........	$ 0	$ 700	$15,100	$32,800	$21,900	$14,500	$ 85,000
b. PE&D..............................	0	0	0	0	0	0	0
c. Expense Funded Equipment..........	0	0	0	0	0	0	0
d. Inventories.......................	0	0	0	0	0	0	0
Total Facility Costs.............	$ 0	$ 700	$15,100	$32,800	$21,900	$14,500	$ 85,000

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d/ Based on completed conceptual design

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Fuel production facility
Savannah River, South Carolina

2. Project No. 85-D-145

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (Cont'd)

2) Other project costs

	Prior Years	FY 85	FY 86	FY 87	FY 88	FY 89	Total
a. R & D necessary to complete construction	$3,550	$3,300	$ 2,200	$ 300	$ 0	$ 0	$ 9,350
b. Conceptual Design	480	100	0	0	0	0	580
c. Engineering Studies	0	2,035	4,475	3,080	730	500	10,820
d. Other project related cost	600	500	1,080	1,210	1,800	2,190	7,380
Total other project costs	4,630	5,935	7,755	4,590	2,530	2,690	28,130
Total project costs	$4,630	$6,335	$22,855	$37,390	$24,430	$17,190	$113,130

B. Other related annual costs (Estimated life of facility= 25 yrs.)

	Cost
1) Facility Operating Costs	$5,500
2) Programmatic Operating Expense Directly Related to the Facility (Annual)	400
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	25
4) GPP or Other Construction Related to the Programmatic Effort in the Facility.....	25
5) Other costs..	0
Total other related annual costs	$5,950

13. Narrative Explanation of Total Project Funding and Other Related Requirements:

A. Total project costs
  1) Total Facility Costs
    a. Construction line item - No narrative required.
    b. PE&D - None
    c. Expense funded equipment - None.
    d. Inventories - None.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Fuel production facility
Savannah River, South Carolina
2. Project No. 85-D-145

13. Narrative Explanation of Total Project Funding and Other Related Requirements: (Cont'd)

2) Other project costs
   a. R&D - A total of $9,350,000 is expected to be spent for process development. Development consists of evaluating processes, experimentally verifying the chosen process, collecting baseline data, and operation of a technology transfer laboratory. Development is expected to continue into construction to verify design areas.

   b. Conceptual design - Includes conceptual design performed on Project 85-D-142.

   c. Engineering studies - Includes fabrication of full scale models, and startup assistance.

   d. Other project-related costs - A total of $1,100,000 has been spent to date for plant liaison. An additional $6,280,000 is expected to be spent for preparation of safety analysis and environmental evaluation, and for preparation of software for computer systems dedicated to security and safeguards and accountability of nuclear materials.

B. Other related annual costs
1. Facility Operating Costs - The annual operating cost is estimated to be $5,500,000 (FY-1985 $) primarily consisting of labor, utilities and raw materials.

2. Programmatic Operating Expenses Directly Related to the Facility - waste handling.

3. Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility - normal replacement costs.

4. GPP or Other Construction Related to Programmatic Effort - cost to update or improve facilities.

5. Other Costs - none.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Safeguards and security improvements, plantwide
Savannah River, South Carolina

2. Project No.: 84-D-134

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3. Date A-E initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 1st Qtr. FY 1985

4. Date construction ends: 1st Qtr. FY 1989

5. Previous Cost Estimate: $47,800
Less amount for PE&D 0
Net cost estimate $47,800 a/
Date: 12/84

6. Current cost estimate: $57,500 b/
Less amount for PE&D 0
Net cost estimate $57,500
Date: 5/85

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7. Financial Schedule:

Fiscal Year		Authorizations	Appropriations	Obligations	Costs
1984		$17,000	$ 0	$ 0	$ 0
1985		14,900	13,450	13,450	3,068
1986		0	7,000	7,000	9,000
1986	Sequestered	0	(685)	(685)	(400)
1987		7,515	14,650	14,650	19,500
1988		14,685	14,685	14,685	16,600
1989		3,400	3,400	3,400	4,737

8. Brief Physical Description of Project

This project provides improvements to safeguards and security systems at the Savannah River Plant in the broad areas of physical security alarm systems, personnel/vehicle access controls, and Special Nuclear Materials (SNM) accountability. Subprojects will provide facilities such as the following:

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a/ Preliminary estimate based on past experience for similar installations.
b/ Based on completed conceptual design and actual cost experience.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and location of project: Safeguards and security improvements, [illegible] Savannah River, South Carolina

2. Project No.: [illegible]

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3. Brief Physical Description of Project (Cont'd)

A. 200-Area Physical Security Upgrades

Extensive physical security upgrades are required for the Separations Areas. Existing Small Control and Alarm Centers (CAC's) will be replaced. The CAC's will include state-of-the-art alarm monitoring equipment with remotely located redundant security computers, automated closed circuit television (CCTV) surveillance systems, communications, remote personnel access control, and redundant alarm monitoring equipment. Access control hardware will be installed at selected locations throughout the areas.

B. Security Contractor Facilities

New facilities are required by the new security contractor to train and condition guard forces, maintain equipment, and to house the administrative personnel required to support their operation. Various buildings will be constructed to meet this need. A training facility, an administrative facility, and a helicopter ground support facility including a hangar building will be constructed. In addition, permanent utilities will be installed at the new security force training area.

C. 300-Area Physical Security Upgrades

A new vehicle and personnel entry control facility (ECF) will be installed to control access to the [illegible] Materials Fuel Fabrication Facility.

D. Vehicle Barriers

Vehicle crash barriers and a reinforced motorized sliding gate will be installed at the Plutonium Fuel Fabrication Facility fence. Vehicle control barriers will be installed at various entry control points, Exclusion Area fences, and around exposed equipment.

E. Material Control and Accountability (MC&A) Improvements

Improvements to the MC&A systems will be installed in the F Separations Area.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security improvements, plantwide
Savannah River, South Carolina

2. Project No.: 84-D-134

6. Purpose Justification of Need for, and Scope of Project

Existing Control and Alarm Centers (CAC's) in H&F Areas are too small for installation and operation of the required upgraded security alarm system.

The security mission at SRP has been assumed by an independent security contractor. Facilities are needed by this contractor to train and condition guard forces, maintain equipment, and house the administrative personnel required to support their operation. These facilities are required to sustain the security contractor's ability to meet all identified threats.

Safeguards material control and accountability (MC&A) systems must provide adequate protection of SNM. New equipment, facilities, and systems to improve the quality and timeliness of accountability measurements are necessary at SRP to ensure compliance with DOE orders, improve existing detection response time, and more accurately account for SNM inventories. As a result of the systems and equipment to be implemented by this project, SRP facilities will be able to retrieve accountability data by material balance area (MBA).

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security improvements, plantwide
Savannah River, South Carolina

2. Project No.: 84-D-134

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10. Details of Cost Estimate [c]

Item			(Dollars in Thousands) Item Cost	Total Cost
A. Engineering design and inspection at approximately 31% of construction costs, Item B				$10,300
B. Construction costs				33,500
1) Improvements to land including roads, walks, fences, excavation grading, landscaping, erosion, and backfill			$ 1,200	
2) Buildings			8,100	
a. WSI training facility (20,000 SF)		$ 800		
b. WSI administrative offices (20,000 SF)		900		
c. Harden storage vault, bldg. 773-A (2,000 SF)		300		
d. Entry control facility, bldg. 701-4M (3,300 SF)		1,500		
e. Helicopter ground support facility (8,000 SF)		900		
f. F Area control and alarm center (4,500 SF)		1,440		
g. Entry control facility, bldg. 701-4F (2,900 SF)		460		
h. H Area control and alarm center (4,500 SF)		1,140		
i. Entry control facility, 701-3H (4,200 SF)		660		
3) Special facilities			$21,800	
a. H&V equipment		1,000		
b. Mechanical equipment		1,700		
c. Electrical equipment		3,500		
d. Security system		9,600		
e. ADP computer systems		6,000		
o F Area ADP system	$ 3,900			
o H Area ADP system	1,300			
o FB Line accountability ADP system	500			
o Other small ADP systems	300			
4) Utilities			$ 2,400	
C. Removal costs				1,000
Subtotal				44,800
D. Contingency at approximately 14% of above cost				6,300
E. Allowance for design and construction liaison, testing, checkout, and acceptance				1,400
Total project cost				$57,500

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[c] The above estimates are based on completed conceptual design and actual cost experience.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Safeguards and security improvements, plantwide
Savannah River, South Carolina

2. Project No.: 84-D-134

11. Method of Performance

Design will be performed by both the operating contractor and negotiated architect-engineer contracts. Construction and procurement will be accomplished by the operating contractors, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

A. Total project costs	Prior Years	FY 85	FY 86	FY 87	FY 88	FY 89	Total
1) Total facility costs							
a. Construction line item..............	$ 0	$ 3,068	$ 8,600	$19,500	$16,600	$ 4,732	$52,500
b. Plant engineering and design (PE&D)	0	0	0	0	0	0	0
c. Expense funded equipment............	0	0	0	0	0	0	0
d. Inventories.........................	0	0	0	0	0	0	0
e. Other plant projects................	0	0	0	0	0	0	0
Total facility costs................	$ 0	$ 3,068	$ 8,600	$19,500	$16,600	$ 4,732	$52,500
2) Other project costs							
a. R&D necessary to complete construction......................	$ 0	$ 0	$ 300	$ 0	$ 0	$ 0	$ 300
b. Conceptual design..................	0	400	0	0	0	0	400
c. Other project related costs	0	1,110	2,315	0	700	100	4,225
Total other project costs	$ 0	$ 1,510	$ 2,615	$ 0	$ 700	$ 100	$ 4,925
Total project costs (Items 1 and 2)..................	$ 0	$ 4,578	$11,215	$19,500	$17,300	$ 4,832	$57,425

B. Other related annual funding requirements (Estimated life of project - 20 years)

	Annual Cost
1) Facility operating costs..	$1,700
2) Programmatic operating expenses directly related to the facility.......................	0
3) Capital equipment not related to construction but related to the programmatic effort in the facility..	0
4) GPP or other construction related to the programmatic effort in the facility..........	0
5) Other costs..	0
Total other related annual funding requirements..	$1,700

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Safeguards and security improvements, plantwide Savannah River, South Carolina	2. Project No.: 84-D-134

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total project costs
  1) Total facility costs
    (a) Construction line item - No narrative required.
    (b) Plant engineering and design - None
    (c) Expense funded equipment - None
    (d) Inventories - None
    (e) Other plant projects
  2) Other project costs
    (a) R&D necessary to complete construction - Development and testing of automatic surveillance, storage, and retrieval system.
    (b) Conceptual design - Includes funds to prepare estimates.
    (c) Other project related costs - Initial training of instrument/electrical maintenance personnel, checkout of computer system installation, engineering studies, development of software by security system vendor to specialize CAC operation to specifications, and development of software by operations personnel for realtime accountability systems.
B. Other Related Funding Requirements
  1) Facility Operating Cost - Aditional maintenance and cleaning personnel associated with new WSI facilities, and new security and accountability systems.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
Materials Production
Atomic Energy Defense Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1.	Title and location of project: Process facility modifications, Richland, Washington	2.	Project No. 84-D-135
3.	Date A-E Work Initiated: 4th Qtr. FY 1984	5.	Previous Cost Estimate: $235,000 a/ Date: 12/84
3a.	Date Physical Construction Starts: 1st Qtr. FY 1987		
4.	Date Construction Ends: 1st Qtr. FY 1993 a/	6.	Current Cost Estimate: $240,000 a/ Date: 1/86

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligation	Costs
1984	$ 7,500	$ 7,500	$ 7,500	$ 1,015
1985	0	10,000	10,000	11,685
1986	25,000	15,000	15,000	18,000
1986 Sequestered	0	(525)	(525)	(400)
1987	34,475	35,000	35,000	27,100
1988	45,575	45,525	45,525	24,800
1989	55,000	55,000	55,000	27,300
1990	55,000	55,000	55,000	51,300
1991	17,500	17,500	17,500	45,100
1992	0	0	0	26,900
1993	0	0	0	7,200

8. Brief Physical Description of Project

This project will provide for modifications to the existing DOE-owned fuel processing facilities at the Hanford site near Richland, Washington, for improved head-end fuel dissolution capability. The Process Facility Modifications (PFM) Project will augment existing chemical processing capabilities by providing for the cladding removal and dissolution of N Reactor and Fast Flux Test Facility (FFTF) spent fuel. This dissolved fuel product subsequently will be processed in the existing chemical processing facilities to separate the plutonium and uranium and convert to oxide products.

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a/ The cost estimate increase and the delay in construction completion are due to FY 1987 funding reductions imposed by stringent budgets.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Process facility modifications, Richland, Washington

2. Project No. 84-D-135

8. Brief Physical Description of Project (Cont'd)

The facility modifications will include a cask receipt and decontamination area capable of handling a variety of truck casks, a rail spur and rail cask car handling capability for N Reactor fuels, a water pool for fuel unloading, transfer, and N fuel storage; a remote, manipulator-operated cell complex for fuel disassembly, cladding removal, dissolution, and waste handling; and a remote canyon cell for feed processing, blending, log storage, and offgas treatment. These areas will be supported by adjoining operating and service galleries and by areas for supporting mechanical equipment, electrical switchgear, control rooms, change rooms, offices, etc. Truck access will be provided for FFTF fuel receipt and rail access for N fuel receipt. Utilities and services will be provided either from site distribution systems (electricity, steam, water), existing process distribution systems (recovered nitric acid, uranyl nitrate hexahydrate), or by a facility dedicated system. The latter will include ventilation air supply and exhaust treatment systems, stack closed loop cooling water, compressed air, emergency power, and plant safeguards systems. Connections will be made to the existing chemical processing facilities by an underground shielded pipe encasement containing lines for feed and waste solution transfers as well as redundant spares. Additional instrumentation, pipe routings, and vessels will be installed in the existing chemical processing facility to integrate PFM into the processing complex.

5112

The facility modifications will include a multi-level structure adjacent to the existing chemical processing facility. The pool and process areas will be heavily shielded with reinforced concrete. Other building areas including support and truck road-dirt washdown will be structural steel with either concrete panels or metal siding with insulation sheeting. The facility will be within the existing security area and will be equipped with door locks and alarms monitored from the existing guard station. Nominal log storage for FFTF fuel assemblies and N fuel canisters will be provided. The FFTF fuel will be mechanically disassembled to permit segregation of nonfuel-bearing components and debris for packaging and disposal. The bundles of fuel pins will be cut into segments and fed directly into the dissolver. N Reactor fuel requires no disassembly, and each element will be cut and the segments fed into the dissolver.

Within the dissolver(s), fuel is recovered from the segmented pins by an acid leaching process. The dissolver solution will be filtered and the solids dissolved to remove residual fuel. Dissolver solution and the dissolver filtrate are combined and blended with recycled solutions to provide a solution suitable for feed to the chemical processing facility. Dissolver solution storage capabilities currently existing within the chemical processing facility will be utilized and supplemented with new instrumentation, pipe routings, and equipment to integrate PFM into the chemical processing facility.

The facility's design will include the flexibility needed for fully meeting process goals. The provision for redundant piping between the existing chemical processing facilities and the PFM will permit the transfer of a variety of process streams between them.

Project activities planned for fiscal year 1987 include the continuation of definitive design and the initiation of construction activities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Process facility modifications, Richland, Washington

2. Project No. [illegible]

3. Purpose, Justification of Need, and Scope of Project

[illegible]

[illegible]

[illegible]

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Process facility modifications, Richland, Washington	2. Project No. 84-D-135

10. Details of Cost Estimate b/

		Item Cost	Total Cost
a. Engineering, design and inspection costs at approximately 28% of construction costs, item b			$ 42,900
b. Construction Costs			153,700
1. Site improvements to land		$ 4,400	
2. Buildings		79,300	
a) Process Building, 110,000 sq. ft. @ $709/sq. ft.	$ 78,000		
b) Support Facilities, 8,000 sq. ft. @ $162/sq. ft.	1,300		
3. Utilities, HVAC		33,100	
4. Special facilities		36,900	
c. Standard Equipment (furniture)			1,000
Subtotal			$197,600
d. Contingency at approximately 21% of above costs			42,400
Total			$240,000

11. Method of Performance

Design and inspection will be performed under a negotiated A-E contract. Construction and procurement will be accomplished to the greatest extent possible by fixed-price contracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	Total
A. Total project costs											
1. Total facility costs											
a. Construction line item	$ 12,700	$17,600	$27,100	$24,800	$27,300	$51,300	$45,100	$26,900	$ 7,200	$ 0	$240,000
b. PE&D	0	0	0	0	0	0	0	0	0	0	0
c. Inventories	0	0	0	0	0	0	0	0	0	0	0
Total facility funding	$ 12,700	$17,600	$27,100	$24,800	$27,300	$51,300	$45,100	$26,900	$ 7,200	$ 0	$240,000

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b/ Cost estimate is based on a completed conceptual design and a partially completed definitive design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Process facility modifications,
Richland, Washington

2. Project No. 84-D-135

12. Funding Schedule of Project Funding and Other Related Funding Requirements (Cont'd)

	Prior Years	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	Total
2. Other project costs											
a. Engineering and Development activities necessary to complete construction	$6,315	$ 4,256	$ 7,184	$ 2,965	$ 1,180	$ 890	$ 295	$ 0	$ 0	$ 0	$ 23,085
b. Conceptual design	8,063	0	0	0	0	0	0	0	0	0	8,063
c. Environmental & safety design analysis	1,386	596	584	415	440	468	319	337	71	50	4,666
d. Technical support, training, & startup	10,785	1,848	3,308	2,620	3,280	4,042	4,886	5,663	11,829	3,550	51,811
e. Capital Equipment not related to construction	35	319	1,000	1,100	2,400	2,000	453	0	0	0	7,307
f. GPP construction related to construction	68	0	0	0	0	0	0	0	0	0	68
Total other project funding	$26,652	7,019	$12,076	$ 7,100	$ 7,300	$ 7,400	$ 5,953	$ 6,000	$11,900	$3,600	$95,000
Total project funding (Items 1 & 2)	$39,352	$24,619	$39,176	$31,900	$34,600	$58,700	$51,053	$32,900	$19,100	$3,600	$335,000

B. Other related funding requirements (Estimated life of facility: 25 years)

1. Facility maintenance and operating cost	$11,000
2. Programmatic operating expenses	1,900
3. Capital equipment not related to construction	0
4. GPP or other construction related to project	$ 0
Total other related annual funding requirements	$12,900

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total project funding

1. Total Facility Costs
   a. Construction Line Item - No narrative required.
   b. PE&D - None required.
   c. Inventories - None required.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Process facility modifications, Richland, Washington
2. Project No. 84-D-135

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (Cont'd)

2. Other project costs
   a. E&D necessary to complete construction - Approximately $23,085,000 will be spent on engineering and development activities including dissolution studies, equipment mockups, and process verification testing.
   b. Conceptual Design - Approximately $8,063,000 has been spent on facility conceptual design.
   c. Environmental and Safety Analysis Report - Environmental and Safety Assessments and Analysis Reports will be prepared, appropriate in scope, to each phase of the project.
   d. Technical support, training and startup - Approximately $51,811,000 will be spent for project support during design and construction, testing, and startup of the completed facility and training of operating personnel.
   e. Capital equipment not related to construction.- Approximately $3,000,000 will be spent for the fuel transport cask design and fabrication. Also included is $4,000,000 for equipment spares and $307,000 for modifications to an existing building for use as the mechanical equipment testing and demonstration facility.
   f. GPP or other construction related to programmatic effort - Approximately $68,000 was spent on definitive design to modify an existing building for use as the mechanical equipment testing and demonstration facility. This effort is now planned to be performed in a different building which will be funded by Item e. above.

B. Total related funding requirements

1. Facility operating costs - An estimated cost of $11,000,000 annually consists primarily of labor and utilities to operate the facility.
2. Programmatic operating costs - $1,900,000 of estimated annual costs consists primarily of other functional support.
3. Capital equipment not related to construction - None
4. GPP or other construction related to Programmatic effort - None

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Enriched uranium conversion facility modifications, Y-12 Plant, Oak Ridge, Tennessee

2. Project No: 84-D-136

3. Date A-E Work Initiated: 4th Qtr. FY 1984

3a. Date Physical Construction Starts: 4th Qtr. FY 1985

4. Date Construction Ends: 2nd Qtr. FY 1988

5. Previous Cost Estimate: $20,600
Date: 12/83

6. Current Cost Estimate: $20,600
Date: 12/85

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	4,400	1,000 [1/]	0	0
1985	8,000	4,400	5,400	2,000
1986	7,200	12,200	12,200	5,950
1987	1,000	3,000	3,000	9,000
1988	0	0	0	3,650

8. Brief Physical Description of Project

Reactivation of the existing dry chemistry facility in the Oak Ridge Y-12 Plant will require extensive refurbishment and restoration. This system is used to convert enriched uranium hexafluoride (UF_6) to uranium tetrafluoride (UF_4) by hydrogen reduction. In addition to the complete disassembly of all major components of the facility, including control instrumentation and ancillary systems for the purpose of inspection to verify functionality as well as the replacement of defective, deteriorated, and nonfunctional equipment, it will be necessary to apply modifications to the system to ensure compliance with EPA, safeguards, and safety regulations.

[1/] FY 1984 reprogramming approved in October 1984.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Enriched uranium conversion facility modifications,
Y-12 Plant, Oak Ridge, Tennessee

2. Project No: 84-D-136

8. Brief Physical Description of Project (cont'd)

Major items presently expected to require replacement are listed as follows: reduction reactors, product powder collection hoppers, primary and secondary filter systems, cylinder receiving scale, cylinder feed manifold, product powder take-off gloveboxes, flow control valves, differential pressure transmitters, pressure recorder/controllers, thermocouples, 3-way solenoid valves, temperature transmitters, heater controls, temperature recorders, and strip heaters in the heated housings. Items to be refurbished include: the vacuum cleaning system, the cold trap station, the fire protection sprinkler system, and all manual valves. New systems to be provided include: sound attenuation for a vibrator system, a new dock and fluoride cylinder manifold, a new connecting network to tie critical alarms to the Plant Monitoring System, a new process control console, a new system for hydrogen and fluoride monitoring, new hydrogen fluoride vent gas treatment system, an enriched uranium accountability satellite computer with associated terminal equipment for output to the existing Y-12 central accountability system, and a personnel and emergency evacuation stairwell from the mezzanine. The project scope may include, but will not be limited to, the above listed items. The remaining facilities and equipment in the dry chemistry system will be dismantled and inspected, and any subsequent replacement or refurbishment will be based upon observed condition.

A prominent feature of the modified conversion facility is the incorporation of many new and improved health and safety devices and designs to minimize uranium losses. An example of this principle is the replacement of the original UF_6 vaporizer system with two new autoclaves or leak-proof pressure vessels designed to heat the UF_6 supply cylinders by forced air convection. Other safety features have been included, such UF_6 detection devices, a capture system, and other improvements related to process control. These changes are expected to preclude the hazards and material losses resulting from ruptures and releases.

A facility for UF_6 sample withdrawal from incoming product cylinders is also included in the project. It is necessary to comply with requirements of the Department's Safeguards Order 5630.2, Control and Accountability of Nuclear Materials, Basic Principles.

9. Purpose, Justification of Need for, and Scope of Project

Renovation of this facility is required to provide a capability to increase the inventory of enriched uranium useful to the DOE's defense program activities for weapons production and production reactor operations. This facility which was previously used for this purpose needs renovation to restore physical deterioration and accommodate modern and environmental concerns. The renovation proposed here will provide conversion capabilities and capacities to satisfy the projected shortages.

There are no other facilities available within the DOE or elsewhere to provide the capability and capacity needed. Renovation of the Y-12 facilities is the most effective way to provide these necessary facilities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Enriched uranium conversion facility modifications, Y-12 Plant, Oak Ridge, Tennessee

2. Project No: 84-D-136

10. Details of Cost Estimate[a]

	Item Cost	Total Cost
A. Engineering, design and inspection at about 21% of construction costs, Item B	$	$ 2,980
B. Construction Costs		14,080
(1) Buildings		
(a) Other, new buildings	1,240	
(b) Building modification and addition	1,440	
(2) Special facilities	11,400	
C. Standard Equipment		100
Subtotal		17,160
E. Contingency at approximately 20% of above costs		3,440
Total Project Cost		$20,600

11. Method of Performance

To the extent feasible, design will be on the basis of a negotiated A-E contract; however, some of the items may be more appropriate for operating contractor design. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

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[a] Based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Enriched uranium conversion facility modifications, Y-12 Plant, Oak Ridge, Tennessee   2. Project No: 84-D-136

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	Total
A. Total Project Funding						
(1) Total Facility Costs						
(a) Construction Line Item	$ 0	$2,000	$ 5,950	$ 9,000	$ 3,650	$20,600
(b) PE&D	0	0	0	0	0	0
(c) Expense Funded Equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total Facility Costs	$ 0	$2,000	$ 5,950	$ 9,000	$ 3,650	$20,600
(2) Other Project Funding						
(a) R&D Necessary to Complete Construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Other Project Related Costs ..	1,025	0	0	0	0	1,025
Total Other Project Funding ..	1,025	0	0	0	0	1,025
Total Project Funding	$ 1,025	$ 2,000	$ 5,950	$ 9,000	$ 3,650	$21,625

B. Total Related Funding Requirements

(1) Facility Operating Costs	$1,050
(2) Programmatic Operating Expenses Directly Related to the Facility	2,450
(3) Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	0
(4) GPP or Other Construction Related to Programmatic Effort in the Facility	0
(5) Other Costs	0
Total Other Related Annual Funding Requirements	$3,500

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Enriched uranium conversion facility modifications, Y-12 Plant, Oak Ridge, Tennessee

2. Project No: 84-D-136

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding
  (1) Total Facility
    (a) Construction Line Item Funding
    (b) PE&D Funding not Required for Titles I and II - not applicable.
    (c) Expense Funded Equipment - not applicable.
    (d) Inventories - not applicable.
  (2) Other Project Funding
    (a) R&D Necessary to Complete - not applicable.
    (b) Other Project Related Funding - Conceptual Design Report (completed at a cost of $255,000), design criteria, project and contract management plans, and quality assurance and safety plans.

B. Total Related Funding Requirements
  (1) Facility Operating Costs - $1,050,000. Includes utilities, janitorial services, related materials and supplies and overhead. The overhead allocation is $305,000.
  (2) Programmatic Operating Expense Directly Related to the Facility - $2,450,000. Includes direct labor, fringes, production materials, supplies, and overhead. The overhead allocation is $710,000.
  (3) Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility to Maintain Viable Facilities - none.
  (4) GPP or Other Construction Related to Programmatic Effort to Sustain Viable Operations - none.
  (5) Other Costs - none.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Facility Security Systems Upgrade, Idaho Fuels Processing Facility (IFPF), INEL, Idaho

2. Project No. 84-D-137

3. Date A-E Work Initiated: 1st Qtr. FY 1985

3a. Date Physical Construction Starts: 1st Qtr. FY 1985

4. Date Construction Ends: 3rd Qtr. FY 1987

5. Previous Cost Estimate: $10,000
Less Amount for PE&D: 0
Net Cost Estimate: $10,000
Date: 12/84

6. Current Cost Estimate: $10,000
Less Amount for PE&D: 0
Net Cost Estimate: $10,000
Date: 1/86

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 2,000	$ 0	$ 0	$ 0
1985	8,000	5,000	5,000	2,998
1986	0	5,000	5,000	5,200
1986 Sequestered	0	(300)	(300)	(200)
1987	0	300	300	2,002

8. Brief Physical Description of Project

This project will provide plant perimeter and internal facility security system improvements needed for compliance with recent planning guidance on special nuclear material (SNM) theft and sabotage protection. It does not duplicate currently authorized upgrade actions. The project will include items such as additional plant perimeter hardening; construction or modification and equipping of hardened entry control points; associated access of patrol roads; plant-related alarm and assessment systems; redundant capabilities for critical systems subject to single point failures; internal material access or storage area hardening; improved access control systems or critical locations; intrusion alarms, surveillance and communications equipment; hardened guard stations; and barriers or positive delay mechanisms. The project will investigate and evaluate alternative approaches to achieving the required SNM theft and/or vital facility sabotage protection measures to assure the end result satisfies current regulations/guidelines, and retains effective operational capabilities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Facility Security Systems Upgrade, Idaho Fuels Processing Facility (IFPF), INEL, Idaho

2. Project No. 84-D-137

9. Purpose, Justification of Need, and Scope of Project

A long-range program to achieve an effective, balanced IFPF safeguards and security system has been in progress for several years. System improvements to date were designed to meet previously established requirements. The requested improvements are necessary for continued compliance with Department of Energy Orders pertaining to the physical protection of special nuclear materials (SNM). The resulting system must detect, and to the extent possible, prevent or deter SNM theft and sabotage related adversary actions and provide the timely warning and interpretation capabilities necessary to effectively counter all anticipated actions. Completion of this and other ongoing or planned projects, together with proposed administrative and procedural changes, should provide the capabilities required for compliance with current regulations and guidelines.

Project activities planned for Fiscal Year 1987 include the completion of design and construction activities initiated in Fiscal Year 1985.

10. Details of Cost Estimate [a/]

	Item Cost	Total Cost
a. Engineering, design and inspection at 21% of construction cost, item b.		$ 1,300
b. Construction cost		6,100
1. Improvements to land: fencing, roads, etc.	$2,300	
2. Building/Structures	620	
3. Special Facilities	560	
4. Utilities	2,620	
c. Standard equipment (to be designed for remote control operations)		510
d. Demolition and removals		90
Subtotal		8,000
e. Contingency at approximately 25% of above costs		2,000
Total estimated costs		$10,000

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a/ Cost estimate based on a completed conceptual design and partially completed definitive design and construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Facility Security Systems Upgrade, Idaho Fuels Processing Facility (IFPF), INEL, Idaho

2. Project No. 84-D-137

11. Method of Performance

Design will be accomplished by negotiated architect-engineer contract and construction and procurement by contracts awarded on the basis of competitive bids, except for alarm equipment which will be Government Furnished Equipment (GFE).

12. Funding Schedule of Project Funding and Other Related Funding Requirements

A. Total Project Costs	Prior Year	FY 1985	FY 1986	FY 1987	Total
1. Total Facility Costs					
(a) Construction Line Item	$ 0	$2,998	$5,000	$2,002	$10,000
(b) PE&D	0	0	0	0	0
(c) Expense Funded Equipment	0	0	0	0	0
(d) Inventories	0	2,998	5,000	2,002	10,000
2. Other Project Costs					
(a) R&D necessary to complete construction.....	$ 370	$ 0	$ 0	$ 0	$ 370
(b) Other project related costs	410	210	210	100	930
Total Other Projects Costs	780	$ 210	$ 210	$ 100	$ 1,300
Total Project Costs	$ 780	$3,208	$5,210	$2,102	$11,300

B. Other Related Funding Requirements

1. Facility Operating Costs..	$160
2. Programmatic Operating Expenses Directly Related to the Facility..........................	0
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	0
4. GPP or Other Construction Related to Programmatic Effort in the Facility	0
5. Other Costs	0
Total Other Related Annual Funding Requirements..	$160

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Facility Security Systems Upgrade, Idaho Fuels Processing Facility (IFPF), INEL, Idaho   2. Project No. 84-D-137

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Costs

1. Total Facility
   a. Construction Line Item - no narrative required.
   b. PE&D - no narrative required.
   c. Expense Funded Equipment - no narrative required.
   d. Inventories - no narrative required.

2. Other Project Costs
   a. R&D Necessary to Complete - approximately $370,000 has been spent for conceptual design.
   b. Other Project Related Costs - approximately $930,000 will be spent for project support during design and construction and for testing and startup of the completed facility

B. Other Related Funding Requirements

It is estimated the facilities will be used 25 years for their programmatic purposes.

1. Facility Operating Costs - facility operating costs amount to $30,000 annually for maintenance and approximately $130,000 annually for additional guard service.
2. Programmatic Operating Expenses Directly Related to the Facility - no narrative required.
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility - no narrative required.
4. CPP or Other Construction Related to Programmatic Effort - no narrative required.
5. Other Costs - no narrative required.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

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1. Title and location of project: Restoration of production capabilities, Phases II, III, IV, and V, various locations

2. Project No. 82-D-124

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3. Date A-E Work Initiated: 1st Qtr. FY 1982

3a. Date Physical Construction Starts: 2nd Qtr. FY 1982

4. Date Construction Ends: 4th Qtr. FY 1989 c/

5. Previous Cost Estimate: $368,000
Less Amount for PE&D: 750
Net Cost Estimate: $367,250
Date: 12/84

6. Current Cost Estimate: $368,000
Less Amount for PE&D: 750
Net Cost Estimate: $367,250
Date: 6/85

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7. Financial Schedule

Fiscal Year		Authorizations	Appropriations	Obligations	Costs
1982		$126,000	$ 45,000[a]	$ 45,000[a]	$ 7,254
1983		8,700	89,700[a]	82,232[a]	30,838
1984		97,134	97,134[b]	104,602	69,474
1985		68,800	72,800	72,800	101,861
1986		43,900	43,900	43,900	91,299
1986	Sequestered	0	(4,300)	(4,300)	(2,600)
1987		7,511	7,811	7,811	43,922
1988		15,205	15,205	15,205	17,543
1989		0	0	0	7,653

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a/ $2,000,000 of FY 1982 Appropriation temporarily reprogrammed to Project 81-D-143 then returned in FY 1983.
b/ $7,466,000 of FY 1984 Appropriation reprogrammed to Project 82-D-126.
c/ Reflects impact of funding stretchouts. Exclusive of Gramm-Rudman-Hollings reduction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, IV, and V, various locations

2. Project No. 82-D-124

8. Brief Physical Description of Project

This project provides for upgrading facilities for the production of nuclear materials in support of the national defense programs. Physical deterioration that has accumulated as a result of the aging of DOE's production plants at Savannah River, South Carolina; Richland, Washington; Oak Ridge, Tennessee; and Fernald, Ohio will be corrected. Due to the size and diverse nature of this undertaking, work has been subdivided into five separate phases. Phase I (Project 81-D-128) was authorized in FY 1981. The following briefly describes the subprojects contained in Phases II, III, IV, and V; all of which are combined in this line item. The actual scope of work to be performed will be updated prior to the initiation of design to encompass any changes in equipment conditions or priorities.

a. Replace Obsolete Plutonium-238 Facilities, HB-Line, Savannah River, South Carolina (TEC $22,500,000; no FY 1987 BA)

This Phase II subproject, the third in a series to replace obsolete HB Line facilities, provides a new building addition for processing plutonium-238. The addition will be located on the top of canyon building 221-H and will be two stories in height and approximately 70 feet by 40 feet in size. Approximately 2300 cubic feet of new glove box cabinets will be provided to permit the radioactive materials to be worked under safe conditions. The ventilation system will be designed to maintain confinement of the materials with air flow directed from clean to progressively more contaminated compartments. Automatic fire suppression will be provided for all process room cabinets.

b. Steam and Power Production Facilities, Savannah River, South Carolina (TEC $3,000,000; no FY 1987 BA)[d/]

This Phase II subproject provides for renovation of wornout and obsolete coal handling components at Savannah River's 484-D Powerhouse. Structural, electrical, and mechanical equipment will be renovated or replaced to improve safety, reliability, and operating efficiency.

c. Reactor Fuel Handling Improvements (Part B), Savannah River, South Carolina (TEC $10,500,000; no FY 1987 BA)

This Phase II subproject completes a series of safety improvements to the handling equipment used to charge and discharge fuel and target assemblies in Savannah River's P, K, and C reactors. Modifications include: multiplexing all control functions; providing alternate power for moving the discharge machine under emergency conditions; separation of normal and emergency power cables; replacement of motor drives; and upgrading of critical components such as the emergency brake, emergency disengaging clutch and release.

[d/] FY 1987 subproject BA's have not yet been updated to reflect impacts of FY 1986 Gramm-Rudman-Hollings funding reductions.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, IV, and V, various locations
2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

d. N Reactor Control Systems, Richland, Washington (TEC $5,000,000; no FY 1987 BA)

This Phase II subproject includes upgrading of the ball safety systems and horizontal control rod system for shutting down N Reactor under normal and abnormal conditions. The ball system upgrade work will include replacement of the ball drain valve operators, and replacement of the upper ball distribution system. The horizontal control rod inserts, which have become pitted from corrosion, will be replaced to forestall rod failure. In addition, the horizontal rod hydraulic power units will be replaced to improve system reliability.

e. N Reactor Coolant System Equipment and Instrumentation, Richland, Washington (TEC $13,972,000; no FY 1987 BA)

This Phase II subproject is intended to forestall the failure or malfunction of major items of equipment and instrumentation in the reactor cooling system that could force reactor shutdown. Worn or obsolete components will be replaced for increased reliability. The work will include items such as: replacement of the secondary cooling system hydraulic valve operators; replacement of a graphite cooling system heat exchanger; replacement of flow rate instrumentation, coolant monitoring instrumentation, and control valves; and upgrading of the coolant water sampling system.

f. Enriched Uranium Processing, Y-12 Plant, Oak Ridge, Tennessee (TEC $7,300,000; no FY 1987 BA)

This Phase III subproject provides for the replacement of existing equipment and facilities in Building 9206 and 9212 at the Oak Ridge Y-12 Plant which are dedicated to the processing of enriched uranium in support of DOE production reactor operations. Obsolete or wornout items such as the evaporator system, uranium-aluminum alloy recovery system, evaporator controls, drying furnaces, filtering equipment, etc. will be replaced. Accomplishment of the project will be spread over a period of four years in order to minimize disruption of production operations.

g. Production Components Replacement, Various Locations (TEC $79,700,000; no FY 1987 BA)

This multi-phase subproject provides for replacement of individual reactor and separations process components that have deteriorated due to age, wear, or the corrosive nature of the materials used in the process operations. At Richland, Washington; N Reactor piping insulation which has been steadily degrading over the past

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, IV, and V, various locations

2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

years will be replaced; instrumentation and controls on the helium gas system, which provides an inert atmosphere to blanket the reactor, will be replaced with more precise units; and the reliability of the equipment annunciator system, which provides data for reactor control and operation, will be improved. At Savannah River, Separations Department components - agitators, vacuum transfer systems, acid recovery columns, dissolver tanks, and instrumentation - will be replaced together with equipment piping, valves, and electrical power distribution systems. Reactor piping and ventilation components that are nearing the end of their lifespan and are no longer repairable will also be renewed together with emergency alarm and communication equipment. Larger Phase V tasks include upgrading of reactor purification cell crane optical systems, replacement of the motor-generators that power the charge and discharge machines, and replacement of existing cation exchange columns.

h. Replace Production Support Equipment and Systems, Various Locations (TEC $76,442,000; no FY 1987 BA)

This multi-phase subproject provides for the replacement of support equipment and systems that have become technologically inadequate or that can no longer reliably perform their assigned function. Most tasks will cost less than $500,000. Work includes replacement of radiation monitoring and contamination control equipment at SR; restoration of Power Department mechanical components and instrumentation systems, SR; replacement of obsolete manipulators and laboratory equipment, SR; upgrading of the fuel fabrication facility, RL; restoration of the N Reactor backup steam supply, RL; replacement of heavy mobile equipment at SR; and other similar activities. Phase V will include new Savannah River tasks such as replacement of the critical alarm systems in the Building 773A high level caves, upgrading of facilities for coulometric determination of plutonium and uranium, and replacement of the 285 F&H process cooling water pump turbines.

i. Replacement Primary Heat Exchangers, Savannah River, South Carolina (TEC $11,400,000; no FY 1987 BA)

This Phase V subproject provides for procurement of replacement production reactor primary heat exchangers. The 36 heat exchangers now in service have reached the end of their service life and are being replaced as failures occur. Two initial replacement units were provided under Phase I of the Restoration Project; $12,000,000 is included in Phase V to procure the next increment of eight replacement units.

j. Restore Deteriorated Canyon Cells, Savannah River, South Carolina (TEC $3,100,000; no FY 1987 BA)

This Phase III subproject replaces canyon cell covers, floor surfaces, and embedden piping that have been corroded by acid vapors to the point that continued deterioration may lead to a loss of production capability.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, IV, and V, various locations

2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

k. Renovation of High Voltage Transmission System Control and Monitoring, Savannah River, South Carolina (TEC $17,000,000; no FY 1987 BA)

This Phase III subproject replaces approximately 67 miles of supervisory control cables and the existing multi-station relay control systems for Savannah River Plant's 115 KV electrical distribution network. Insulation and shielding on the existing underground cables have only limited remaining life.

l. Replace Plutonium Precipitator Cabinets, Savannah River, South Carolina (TEC $13,000,000; no FY 1987 BA)

This Phase II subproject provides replacement shielded cabinets and process equipment to precipitate and filter plutonium trifluoride from plutonium nitrate solutions. The existing cabinets and equipment are in poor condition and can no longer meet radiation protection or reliability requirements. New tanks, washing stations, and seal pots will be installed together with associated piping, instrumentation and other auxiliaries.

m. JB-Line Restoration, Part A, Savannah River, South Carolina (TEC $11,700,000; no FY 1987 BA)

This Phase II subproject provides for the repair or replacement of JB-Line plutonium processing equipment and systems that have become worn and unreliable. Items to be restored include: the oxidation furnace, holdup and filtrate neutralization cabinets, the hydraulic lift system, breathing air compressors, process piping, and the heating and ventilating system.

n. Reactivation of UF_6-UF_4 Reduction Facility, Feed Materials Production Center, Fernald, Ohio (TEC $12,113,000; no FY 1987 BA)

This Phase II subproject covers the reactivation and replacement of existing equipment at the Feed Materials Production Center which will be used to reduce uranium hexafluoride (UF_6) to uranium tetrafluoride (UF_4). The items proposed for reactivation or replacement include autoclave vaporizers, ammonia dissociators, and the refrigeration system for recovery of anhydrous hydrogen fluoride.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, IV, and V, various locations

2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

o. Uranium Target Plating Line, Savannah River, South Carolina (TEC $5,600,000; no FY 1987 BA)

This Phase III subproject will provide an automated plating line to nickel plate uranium slugs in the fuel processing area at the Savannah River Plant. The automated plating line will replace an existing line, which is no longer capable of maintaining required production levels and will be removed. The new plating line will consist of two sections, one for anodic etching and the other for nickel plating. It will be installed in space available in the existing uranium slug manufacturing building, adjacent to the present plating line.

p. Restoration of Special Materials Processing Facilities, Feed Materials Production Center, Fernald, Ohio (TEC $9,233,000; no FY 1987 BA)

This Phase III subproject provides for restoration of a furnace used to melt and cast uranium. New crucible loading and burnout stations will be installed for this furnace and the obsolete burnout stations in Plant 5 will be reconditioned. The existing vacuum pumps, controllers, voltage regulators, and mold tanks in Plant 5 will also be restored.

q. Modifications to Radiological Support Facilities, Savannah River, South Carolina (TEC $8,100,000; no FY 1987 BA)

This Phase IV subproject provides an approximately 25,000 square foot addition to the existing Radiological and Environmental Science Laboratory. About 60 percent of the building area will be devoted to laboratories and about 40% to offices and support facilities. This project is required to support the expanding programs of the Savannah River Laboratory Environmental Sciences Section (ESS) and the Savannah River Plant Health Protection Department.

r. Powerhouse Coal Handling Facilities, Savannah River, South Carolina (TEC $6,100,000; no FY 1987 BA)

This Phase IV subproject will restore the mechanical, structural, and electrical components of the P, K, H, and A Area powerhouse coal handling systems. These facilities have deteriorated from use and corrosion caused by water and coal leachate. Replacement of the moderate to severely damaged parts is required to maintain safety and reliability. Associated electrical systems must also be upgraded to comply with current dust-ignition-proof code requirements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities,
Phases II, III, IV, and V, various locations

2. Project No. 82-D-124

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8. Brief Physical Description of Project (cont'd)

s. Production Control Facility, Savannah River, South Carolina (TEC $15,500,000; no FY 1987 BA)

This Phase III subproject provides a 34,000 square foot addition to the existing Production Control Facility, Building 772-F, to analyze highly radioactive process samples from dissolution of fuel tubes and target slugs. These analyses are used to determine the quantity of plutonium produced in the Savannah River reactors and to measure the results of succeeding chemical separations steps. Operating delays are already being experienced due to slow answers and inaccurate results. With the increased separations throughput that will occur when L Reactor is brought on-line problems will become more frequent. Further, the overall condition of the existing facility has deteriorated to a level where the risk of major long term outage due to accident or equipment failure is excessive. The addition will contain 17 laboratories, four shielded analytical cells, a control room, and necessary service facilities.

t. JB-Line Restoration, (Parts B & C), Savannah River, South Carolina (TEC $22,400,000; FY 1987 BA $5,400,000)

This Phase IV subproject upgrades and overhauls JB-Line facility equipment to restore equipment reliability to meet Pu-239 production commitments. Overhaul will consist of replacement of instrumentation and equipment with state-of-the-art design where practical, replacement of wornout equipment, regasketing of piping and upgrades of cabinet panel seal and H&V system. Overhauls on each glovebox will be performed in a manner to minimize downtime. The following are five areas of work for JB-Line restoration covered in Parts B and C:

(1) Complete duct piping upgrades.
(2) Overhaul Recovery Process Equipment.
(3) Miscellaneous Mechanical Line Upgrades.
(4) Replace Anion and Recovery Control Panels.
(5) Install new solution transfer vacuum system.

FY 1987 BA will be used to complete construction.

u. Replace Emergency Cooling Water Drain Lines, Savannah River, South Carolina[a] (TEC $4,590,000; no FY 1987 BA)

This Phase III subproject replaces sections of the underground vitrified clay drainlines that are used to convey contaminated water from the P, C, or K reactors in event of activation of the emergency cooling system or process room spray systems. Existing drainlines have cracked and should not be subjected to prolonged pressurized operation. The new replacement lines will be reinforced concrete for increased structural integrity and will be sized for 17,500 gallons per minute of flow.

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[a] Originally listed as a "Production Components Replacement" task.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and location of project: Restoration of production capabilities, Phases II, III, IV, and V, various locations

2. Project No. 82-D-124

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8. Brief Physical Description of Project (cont'd)[e]

   v. Warm Canyon Cranes, Savannah River, South Carolina (TEC $9,000,000; FY 1987 BA $2,411,000)

   This Phase V subproject replaces the cranes, including all electrical and mechanical components, in the 200 F and H area warm canyons. FY 1987 BA will be used to continue construction.

9. Purpose, Justification of Need for, and Scope of Project

The Restoration Project directly supports the department's assigned mission of providing nuclear materials for national defense needs. The facilities and equipment involved are the prime source of weapon-grade materials within the United States. It is therefore necessary that excessive breakdowns be avoided and that production needs be met in a safe, effective, and efficient manner.

The majority of Nuclear Material Production's plants are now over twenty-five years old and have considerable age deterioration. Some of the equipment is obsolete and/or replacement parts are unavailable. In many cases vendors who furnished the equipment twenty-five years ago are no longer in business. Further, transitions in safety, process, and regulatory requirements over the years have caused some original facilities to become deficient with respect to the current state-of-the-art.

Due to funding restraints; line item construction, general plant projects and capital equipment appropriations have been insufficient to correct these deficiencies as they developed. Items previously considered deferable have gradually reached the point of urgency.

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[e] Subproject "W" - Central Powerhouse Control Savannah River - has been deleted from scope of work.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, IV, and V, various locations

2. Project No. 82-D-124

9. Purpose, Justification of Need For, and Scope of Project (cont'd)

The measures necessary to restore the production complex to a condition adequate to meet mission requirements was submitted to Congress in June 1979. Execution is being achieved through this five phase construction effort and associated operating funded activities. The final escalated cost of both activities will be approximately $460 million.

10. Details of Cost Estimate[a]

5.35

	Item Cost	Total Cost
A. Engineering, Design and Inspection Costs at approximately 19% of construction costs, Item B		$ 36,090[b]
B. Construction Cost		243,900
(1) Improvements to land	$ 4,155	
(2) Buildings	35,947	
(3) Special Facilities	200,355	
(4) Utilities	3,443	
C. Removal Costs Less Salvage		3,850
D. Equipment		24,870
Subtotal		308,710
E. Contingency at approximately 19% of above cost		58,540
Total Project Cost		$367,250

11. Method of Performance

Design will be performed by both the operating contractors and negotiated architect-engineer contracts. Construction and procurement will be accomplished by the operating contractors, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

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[a] The above estimates are based on varying degrees of subproject completion, ranging from partial design to actual construction costs.

[b] Excludes $750,000 PE&D.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, IV, and V, various locations

2. Project No. 82-D-124

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	Total
A. Total project funding										
(1) Total facility costs										
(a) Construction line item	$ 0	$7,254	$30,838	$69,474	$101,861	$88,699	$43,922	$17,549	$7,653	$367,250
(b) Plant Engineering and Design (PE&D)	0	0	50	700	0	0	0	0	0	750
(c) Operating Expenses Funded Equipment	0	0	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0	0	0	0
Total Facility Costs	$ 0	$7,254	$30,888	$70,174	$101,861	$88,699	$43,922	$17,549	$7,653	$368,000
(2) Other project funding										
(a) Conceptual design and engineering studies	$1,985	$ 3,472	$ 665	$ 50	$ 0	$ 0	$ 0	$ 0	$ 0	$ 6,172
(b) Other project related costs.	600	10,389	15,528	$15,047	9,185	7,379	0	0	0	58,128
Total other project funding.	$2,585	$13,861	$16,193	$15,097	$ 9,185	$7,379	$ 0	$ 0	$ 0	$ 64,300
Total project funding (Item 1 & 2)	$2,585	$21,115	$47,081	$85,271	$111,046	$96,078	$43,922	$17,549	$7,653	$432,300

B. Total Related Funding Requirements (Estimated Life of Project = 20 years)

(1) Facility Operating Costs	$(615)
(2) Programmatic Operating Expenses Directly Related to the Facility	0
(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
(4) GPP or other Construction Related to the Programmatic Effort in the Facility	0
(5) Other Costs	0
Total Other Related Annual Funding Requirements	$(615)

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II, III, IV, and V, various locations

2. Project No. 82-D-124

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding
  (1) Total Facility Costs
    (a) Construction line item - No narrative required.
    (b) PE&D - $750,000 in FY 1983.
    (c) Expense funded equipment - None.

  (2) Other Project Funding
    (a) Conceptual design - No narrative required.
    (b) Other project related costs - This item includes:
      o $13,000,000 for decontamination and disposal of obsolete HB-Line facilities after completion of the new subprojects.
      o $9,380,000 for liaison and startup.
      o $5,965,000 for program management and administration.
      o $32,800,000 for operating funded repairs and renovation.

B. Total Related Funding Requirements

This project will provide replacement or modification of existing facilities. The modified facilities are intended to be used in lieu of the facilities they replace. Expenses to operate and maintain the modified facilities will be essentially the same or less than the existing facilities. The savings shown result from reduced operating cost.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

Construction project Data Sheet
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands - Narrative in whole dollars)

1. Title and location of project: Fuel Processing Facilities Upgrade
Idaho Fuels Processing Facility
INEL, Idaho[a]

2. Project No. 82-D-136

3. Date A-E work initiated: 2nd Quarter FY1982

3a. Date physical construction starts: 4th Quarter FY1982

4. Date construction ends: 4th Quarter FY 1990[a]

5. Previous cost estimate:	$46,000
Date: 12/83	
6. Current cost estimate:	$46,000
Less amount for PE&D:	0
Net cost estimate:	$46,000
Date: 12/85	

7. Financial Schedule:

FISCAL YEAR	AUTHORIZATION	APPROPRIATIONS	OBLIGATIONS	COSTS
1982	$ 40,000	$10,500[b]	$ 10,500[b]	$ 1,053
1983	0	16,500[c]	16,500[c]	5,487
1984	6,000	18,000	18,000	7,849
1985	0	1,000	1,000	4,484
1986	0	0	0	8,500
1987	0	0	0	9,600
1988	0	0	0	6,700
1989	0	0	0	1,427
1990	0	0	0	900

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[a] This construction project data sheet has been revised to reflect minor changes in the project's scope and a delay in construction completion. Task No. 13, Liquid Effluent Disposal, is being added to the project's scope to allow the IFPF to remain in compliance with regulatory limits on discharge of radionuclides. Favorable construction contract bids and resultant cost savings to date are permitting this scope addition. Total estimated cost remains at $46,000,000 with no additional funding required.

[b] $3,500,000 of FY 1982 Appropriation of $14,000,000 temporarily reprogrammed to Project 81-D-143, L Reactor Upgrade. Funds were returned in FY 1983.

[c] Reflects a reprogramming of $1,000,000 of FY 1983 funds to Project 82-D-128, Plant Perimeter Security System Upgrade.

Construction Project Data Sheet

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1. Title and location of project: Fuel Processing Facilities Upgrade
Idaho Fuels Processing Facility
INEL, Idaho

2. Project No. 82-D-136

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8. Brief Physical Description of Project:

The Idaho Fuels Processing Facility (IFPF) supports the nation's defense by processing naval nuclear propulsion fuels and thus closes the Navy's fuel cycle while providing fuel for the DOE production reactors. The Navy has forecasted a forty-year mission for the IFPF which will increase its base processing load substantially beyond present capacity.

This project addresses certain high priority requirements identified for interim, reliable nuclear fuel processing at IFPF by providing for Title I and Title II design, Advance Procurement, Title III Inspection, and Construction of systems and facilities urgently needed for the continued safe and orderly operation of the IFPF. Specifically, the project will provide the following: (1) refurbishment of the main stack; (2) an improved solvent treatment system; (3) upgrade of the atmospheric protection system; (4) modification of the process equipment waste (PEW) system; (5) replacement of uranium salvage vessels with critically safe vessels; (6) upgrade of the existing product denitration system; (7) modification of the off-gas system; (8) upgrade of process sampling and transfer systems; (9) upgrade of various waste systems; (10) construction of glove box samplers; (11) construction of critically safe storage vessels for 2nd and 3rd cycle raffinate; (12) upgrade of liquid waste evaporator system; and (13) construction of a system to reduce radionuclide concentrations in liquid effluent discharged to the percolation pond.

Support systems (e.g., utilities, instrumentation, etc.) will be provided such that all modifications will be fully operable at construction completion. Design will consider future expansion plans and will be compatible with these plans to the greatest practicable extent and will include studies to confirm future interfaces.

9. Purpose, Justification of Need, and Scope of Project:

This project is needed to immediately correct problem areas which exist at the IFPF. Without these upgrades use of the IFPF may be jeopardized by increasing safety and reliability problems and concerns. Replacement of the existing main processing facility is under design (Project 85-D-139, Fuel Processing Restoration) which will safely and efficiently meet the long-term mission.

The existing IFPF processing facility was constructed 25 years ago and several plant systems have deteriorated through normal wear and corrosion. This deterioration decreases the safety, reliability, functional use, and efficiency of several process systems. This project is needed to preclude the following occurrences:
(1) prolonged shutdown of the IFPF due to an inadvertent criticality; (2) prolonged shutdown of the IFPF due to failure of a key equipment item; (3) accumulation of personnel radiation exposure beyond as-low-as-reasonably-

1. Title and location of project: Fuel Processing Facilities Upgrade
Idaho Fuels Processing Facility
INEL, Idaho

2. Project No. 82-D-136

9. Purpose, Justification of Need, and Scope of Project: (continued)

achievable levels (ALARA); (4) unacceptable safety risks due to previously described items (1), (2), and (3); and (5) reduced plant throughput in order to comply with environmental regulations. Loss of a key process would prevent operation of other critical IFPF processes and seriously impair the ability to process nuclear fuel. Such a shutdown would preclude recovery of valuable enriched uranium resources and the return of these resources to productive use.

Structural modifications to the stack are necessary for continued operation of the IFPF. The existing 25-year-old reinforced concrete stack at IFPF has deteriorated from acid attack and has many hairline cracks. Mortar bonding between some of the acid-proof bricks in the stack liner is missing or badly deteriorated which could allow the bricks to fall out and corrosive gases to enter the annular space between the liner and concrete support shell with subsequent attack on the concrete. Core sections removed from the stack in 1978 allowed both visual observation and structural evaluation of the damage and indicated marginal structural integrity. Therefore, emergency repairs to temporarily stabilize the stack have been made. This project provides for the structural strengthening of the existing chimney to satisfy current seismic standards as well as stabilization of the existing brick liner.

The present solvent treatment system generates unnecessarily large quantities of spent solvent and permits discharge of residual amounts of radionuclides. The improved solvent treatment system will cleanup this exhaust.

The existing off-gas system no longer operates with the margins of safety and reliability considered appropriate for IFPF missions. For example, the Process Building process off-gas systems filtration has been a significant source of personnel radiation exposure when the plant is operating. Presently, the filters become loaded and require replacement every three to five days. Filter changeout is done manually resulting in near unacceptable operating and maintenance personnel radiation exposure. The existing process off-gas system uses the Atmospheric Protection System (APS) as primary filtration. Because the APS has been used for primary protection, the APS prefilter has accumulated considerable contamination. It has no means of internal decontamination, thus, the radiation levels in the prefilter room have risen. Also, the valves, instrumentation, and other routinely used equipment are located (operable and readable) only in the prefilter room adjacent to the prefilter. Both situations result in repeated radiation exposure to operating and maintenance personnel.

The Process Equipment Waste (PEW) evaporator feed tank provides the sole source of surge capacity for the Process Equipment Waste/Cell Floor Drain (PEW/CFD) transfer system. If it were to fail, it would necessitate complete shutdown of the IFPF aqueous liquid waste system. The tank has received corrosive solutions containing

Construction Project Data Sheet

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1. Title and location of project: Fuel Processing Facilities Upgrade
Idaho Fuels Processing Facility
INEL, Idaho[a]

2. Project No. 82-D-136

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9. Purpose, Justification of Need, and Scope of Project: (continued)

undissolved solids for more than 25 years. There is not usable personnel access, decontamination capability, inspection capability, or solids removal capability for this vessel. This has resulted in the undesirable existing conditions:

(1) The usable storage volume of the tank has been reduced by 15% due to accumulation of the undissolved solids received by the vessel.
(2) The integrity of the tank wall is unknown because the effects of the corrosive solutions to which it has been exposed are not easily determined.

The existing product denitration system has a primary system vessel which is not criticality safe by geometry. The operating reliability is poor and there have been minor accidental contaminations of working areas. In addition, the process instrumentation is old and is located adjacent to the denitration vessel in a contamination-prone area.

There are systems in which criticality safety is a concern. For example, the existing uranium salvage vessels are made criticality safe by using internal boron poison plates. These poison plates may be partially dissolved by corrosion due to chemicals used in the system. Since no practical method is available to evaluate the poison and vessel integrity on a routine basis, projections of the vessel and poison life are not available. In some of the systems the instrumentation used for process control is outmoded and subject to malfunction, thus accountability and inventory control may be compromised.

Selected process sampler systems will be replaced to provide structures, samplers and transfer systems capable of increasing radiation and contamination control and safety while obtaining and transferring samples to the analytical laboratory.

Replacement of the plant's westside service waste control equipment and piping is needed to reduce the risk of an accidental discharge of contaminated waste to the percolation pond. In addition, emergency power will be provided to the westside service waste pumps.

The WC-114 evaporator is used to concentrate decontamination solutions and other wastes which are too high in radioactivity to be processed by the PEW evaporator, and too dilute to be sent directly to the tank farm or to be calcined. The existing WC-114 evaporator is deteriorating due to corrosion, has insufficient instrumentation and is a slow, inefficient process. The upgrade would replace the existing evaporator, condenser, and associated instrumentation with a safer, more efficient, corrosion resistant evaporation system.

Construction Project Data Sheet

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1. Title and location of project: Fuel Processing Facilities Upgrade
Idaho Fuels Processing Facility
INEL, Idaho

2. Project No. [illegible]

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9. Purpose, Justification of Need, and Scope of Project: (continued)

Presently, the PEW Evaporator condensate is discharged with other service waste from the plant to a percolation pond. The present practice complies with all regulatory limits for discharge; however, radionuclide concentrations are projected to increase because of an increase in plant throughput and changes in the reactor fuel being processed. To continue to meet regulatory limits on discharge of radionuclides, features will be provided to remove the radionuclides consistent with ALARA and dispose of the treated stream by evaporation.

10. Details of Cost Estimate: [d]

		Item Cost	Total Cost
a.	Engineering, design and inspection at approximately 30% of construction costs, item b		$11,700
b.	Construction costs		79,700
	1. Stack	4,720	
	2. Solvent Treatment System	570	
	3. Atmospheric Protection System	640	
	4. Process Equipment Waste System	3,700	
	5. Rework Cell Vessels	3,700	
	6. Denitration System	7,200	
	7. Vessel Off-Gas	170	
	8. Remote Sampling and Transfer System	1,000	
	9. Waste Systems Upgrade	1,100	
	10. Glove Box Sampling and Transfer System	3,700	
	11. Second and Third Cycle Raffinate Upgrade	3,300	
	12. WC-114 Evaporator Upgrade	970	
	13. Liquid Effluent Disposal	3,800	
	Subtotal		$87,400
c.	Contingency at approximately 11% of above costs		9,600
	Total Project Costs		$97,000

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[d] The cost estimates are based on a composite of actual costs, competitive bids, completed definitive designs, and completed conceptual designs. Construction is approximately 40 percent complete.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
DEFENSE WASTE AND BYPRODUCTS MANAGEMENT
Atomic Energy Defense Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Approp.	FY 1986 Adjusted Approp. f/	FY 1987 Base f/	FY 1987 Request	Request vs Base
Defense Waste and Byproducts Mgmt. (DP)					
Operating Expenses:					
Interim Waste Oper ...	$ 239,810a/b/	$ 262,221d/	$ 262,221d/	$ 324,730	$ +62,509
Long-Term Waste Mgmt. Technology	90,400	89,773	89,773	88,820	-953
Terminal Storage	25,800	23,982	23,982	39,100	+15,118
Program Direction	1,955a/	2,370	2,370	2,400	+30
Total Operating Exp .	357,965	378,346	378,346	455,050	+76,704
Capital Equipment	33,881a/b/	33,769	33,769	37,805	+4,036
Construction	335,900c/	215,534c/e/	215,534c/e/	211,545	-3,989
Reduction From Prior Year Construction Projects	0	-9,225	-9,225	0	+9,225
Total Defense Waste and Byproducts Mgmt .	$ 727,746	$ 618,424	$ 618,424	$ 704,400	$ +85,976
Staffing Total FTE's	161	157	157	157	0
Headquarters	42	41	41	41	0
Idaho	119	116	116	116	0

Authorization: Section 1, Public Law 83-703.

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a/Reflects rescission allocation of $440,000 for Operating Expenses; $145,000 for Program Direction; and $1,740,000 for Capital Equipment pursuant to Section 2901 of the Deficit Reduction Act of 1984 (P.L. 98-369).

b/Reflects distribution of $150,000 to Interim Waste Operations Operating Expenses and $150,000 to Capital Equipment for ADP General Reduction.

c/The FY 1985 and FY 1986 amounts reflect reductions of $2,900,000, and $2,025,000, respectively, for IG audits, savings from management initiatives, and general reductions.

d/Reflects proposed appropriation transfer reduction of $300,000 for Environmental Assessment Activities to Energy Supply Research and Development Appropriation.

e/Reflects proposed appropriation transfer of $200,000 to Departmental Administration for general FTE clerical reduction.

f/Reflects $36,966,000 sequestered to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (P.L. 99-177).

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
DEFENSE WASTE AND BYPRODUCTS MANAGEMENT
(Dollars in Thousands)

FY 1986 Adjusted Appropriation/FY 1987 Base	$ 618,424
Program increases and decreases:	
Interim Waste Operations	
o Escalation increase for Interim Waste Operations operating funds	+13,126
o Continue operations to stabilize and isolate old single-shell waste tanks at Hanford	+5,261
o Operate the B-Plant at Hanford to process additional waste streams from plutonium uranium extraction (PUREX) operations	+2,293
o Support grout disposal operations for liquid low-level waste (LLW) at Hanford	+2,974
o Continue efforts necessary to complete and implement the Hanford Defense Waste Environmental Impact Statement (EIS)	+976
o Support continued operations of the Stored Waste Examination Pilot Plant (SWEPP) and hot startup of the Processing Experimental Pilot Plant (PREPP) at the Idaho National Engineering Laboratory (INEL)	+3,662
o Continue waste transfer program at Savannah River (SR) to remove waste from old tanks; prepare feed for the Defense Waste Processing Facility (DWPF); and begin full-scale salt and sludge processing	+4,464
o Support preoperational DWPF vitrification activities at SR to assure facility operation on schedule	+17,000
o Support operations to remove salt from double-shell tanks to assure adequate space for storage of waste generated by increased high-level waste (HLW) production at SR	+5,600
o Begin scheduled startup of DWPF saltstone facility in FY 1988	+9,100
o Support continued base operations at Albuquerque (AL), Hanford, INEL, SR, Nevada (NV), Feed Materials Production Center (FMPC), and Oak Ridge National Laboratory (ORNL); provide for basic landlord requirements at Hanford and INEL; and support the Departmental Transportation Operations and Traffic Management Program at all sites	-3,924
o Continue ongoing disposition of defense surplus facilities at Mound, ORNL, INEL, and Hanford; complete engineering and initiate remedial actions for Grand Junction Treasure Island Facility	+1,977
Long-Term Management Technology	
o Escalation increase for Long-Term Management Technology operating funds	+4,489

Continue technology development for the long-term HLW management activities at Department of Energy (DOE) sites with reduced process development and engineering evaluations at SR	-3,796
Continue direct support of DOE LLW disposal site operations and technology development to assure that evolving Federal and State standards and issues are satisfied	+1,544
Continue hazardous waste technology application and technical support for Defense Program (DP) sites in order to cost-effectively comply with environmental regulations	+278
Continue transuranic (TRU) waste program activities to provide certified wastes for emplacement in Waste Isolation Pilot Plant (WIPP), including system integration and certification of remote-handled and special case waste	+988
Complete PREPP at INEL and continue engineering studies for TRU Waste Facilities at Hanford and Savannah River	-2,517
Continue transportation research and development (R&D) at a minimal level to meet priority DP needs	-1,939

Terminal Storage

Escalation increase for Terminal Storage operating funds	+1,199
Transition the WIPP project from construction to operations	+13,919

Program Direction

Increase in personnel costs	+30

Capital Equipment

Escalation increase for Defense Waste and Byproducts Management (DWBM) capital equipment funds	+1,686
Provide critical base programmatic equipment at all Interim Waste Operations sites and critical landlord equipment at Hanford and INEL; and Long-Term Waste Management Technology and Terminal Storage equipment	+2,350

Construction

Escalation increase for DWBM general plant projects (GPP)	+1,171
Provide critical base general plant projects to support programmatic activities at Los Alamos National Laboratory (LANL), Hanford, INEL, ORNL, SR, and Nevada Test Site (NTS); support landlord activities at Hanford and INEL; and support DWPF HLW activities under Long-Term Waste Management Technology	+421
Support immediate GPP requirements for waste storage, processing, and decontamination facilities at FMPC	+1,490
Initiate design and construction to upgrade the Waste Encapsulation and Storage Facility (WESF) K-3 Filter System and eliminate a potential safety and environmental hazard at Hanford (TEC $3.3M)	+500

o Initiate design and construction to upgrade the 242-A evaporator/ crystallizer at Hanford to assure continued reliable operation and HLW volume reduction (TEC $12.6M)	+2,800
o Initiate design and construction of the 241-AQ tank farm, which consists of four double-shell aging (high-heat) HLW storage tanks, conversion of 107-AN tank to an aging waste tank, and design and construction of supporting facilities at Hanford to assure continued availability of HLW storage capacity (TEC $58.0M)	+2,100
o Initiate design and construction of a Steam Transfer Line at Hanford to allow steam transfer between 200-East and West Areas to meet production demands (TEC $13.5M)	+900
o Initiate design and construction of the Test Reactor Area (TRA) Liquid Radioactive Waste Cleanup project, Phase III, at Idaho Landlord, to complete the elimination of the disposal of liquid radioactive waste directly to the soil (TEC $5.5M)	+700
o Initiate design and construction of a New Burial Ground for the disposal of solid LLW at SR to assure the continued availability of burial ground space (TEC $14.5M)	+6,300
o Initiate design and construction of tank farm containment buildings which will improve worker safety and increase efficiency of tank farm operations by minimizing impacts of weather and other adverse climatological conditions on production operations at SR (TEC $17.3M)	+1,360
o Continue prior year project: B-Plant F filter at Hanford (TEC $4.0M)	+2,051
o Reprogram prior-year project to operating dollars: Design-only line item for a Central Waste Disposal Facility (CWDF) for low-level radioactive waste generated by all Oak Ridge (OR) facilities (TEC $1.0M)	-949
o Continue design and construction of a LLW Processing and Shipping System at FMPC to prepare the waste for shipment and off-site disposal at another DOE facility (TEC $17.0M)	+7,628
o Continue design and construction on upgrade of the INEL guard stations and security facilities to meet DOE security requirements (TEC $10.0M)	+5,342
o Continue prior year project: Seventh Calcined Solids Storage Facility at INEL to support continued Idaho Chemical Processing Plant (ICPP) operations (TEC $23.3M)	-12,519
o Continue prior year project: Central Warehouse at Hanford landlord, to replace an old warehouse which is beyond economical repair and represents a safety hazard (TEC $13.0M)	-3,444
o Continue design and construction of New Waste Transfer Facilities project at SR (TEC $41.0M)	+82
o Continue TRA Security System Upgrade Project at INEL (TEC $7.0M) ..	+547

o Continue prior year project: Waste Handling and Isolation Facilities Project at Hanford, consistent with stabilization and isolation of old single-shell tanks (TEC $34.5M)	-49
o Continue construction of DWPF at SR to immobilize HLW for disposal, leading to completion at the end of FY 1989 and "hot" operation in early FY 1990 (TEC $870.0M)	-23,400
o Reductions from prior year construction projects	+9,225
FY 1987 Budget Request	$704,400

DEPARTMENT OF ENERGY

FY 1987 CONGRESSIONAL BUDGET REQUEST

DEFENSE WASTE AND BYPRODUCTS MANAGEMENT

Program Overview

The goal of the Defense Waste and Byproducts Management (DWBM) program is to provide for safe interim storage, disposal or utilization of radioactive waste and byproducts generated primarily from nuclear materials production and naval propulsion. This requires development of technologies and facilities for the processing and final disposal of defense waste.

The program has three primary elements: Interim Waste Operations, Long-Term Waste Management Technology, and Terminal Storage. These elements provide mainly for the handling and disposal of low-level waste (LLW), the storage of transuranic (TRU) waste and high-level waste (HLW), development of technology for the long-term management of radioactive waste, and the demonstration of the safe disposal of defense TRU waste and HLW. The FY 1987 budget supports the implementation of the policies contained in the Defense Waste Management Plan (DWMP) which was prepared in response to Public Law (P.L.) 97-90 and signed by the President on June 19, 1983.

Fiscal year 1987 efforts in the Interim Waste Operations Program will continue the upgrading of waste handling, storage, and disposal operations by transferring HLW from old tanks at Savannah River (SR) and Hanford into new double-shell tanks, construction of new facilities, improvement of existing facilities, upgrading of burial ground operations, and the management of defense surplus facilities. In addition, funding is provided within the Interim Waste Operations Program to continue operation of the Stored Waste Examination Pilot Plant (SWEPP) and complete the hot check-out of the Processing Experimental Pilot Plant (PREPP), both located at Idaho (ID) to prepare stored TRU waste for shipment to the Waste Isolation Pilot Plant (WIPP). Also, the B-Plant at Hanford will continue its transition from a byproduct recovery facility to a facility to pretreat newly generated plutonium uranium extraction (PUREX) waste and stored HLW to reduce the volume which will ultimately require vitrification. Funding is also provided to prepare for operation of the Saltstone Facility and to prepare for cold checkout of the Defense Waste Processing Facility (DWPF) vitrification plant in 1988 at SR. The long-term program in FY 1987 will continue to focus on construction of the DWPF at SR, and the preparation for operation of the WIPP. Activities will also support plans at Hanford for operation of a HLW vitrification facility in the mid-1990's. The Long-Term Technology Program will also examine technology applicable to hazardous waste management operations at Defense Programs (DP) sites.

The DWPF will provide the final step in processing HLW at SR for disposal. Facility construction began in early FY 1984 and will be completed at the end of FY 1988. Hot operation of the vitrification plant is now scheduled for early FY 1990. The DWPF will immobilize the HLW in borosilicate glass for storage, transportation to, and disposal in a geologic repository. Immobilization in DWPF and disposal in a repository will ensure the long-term isolation of this waste from the environment with minimal maintenance and surveillance.

The WIPP, located near Carlsbad, New Mexico, will demonstrate the safe disposal of defense nuclear waste. The WIPP facilities will be capable of routine operations to receive, inspect, and emplace defense nuclear waste in a geologic disposal environment. This research and development (R&D) facility will be sized to handle quantities typical of defense nuclear waste inventories and anticipated generation rates. Emplacement of radioactive waste in WIPP will begin in late 1988.

Construction Project Data Sheet

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1. Title and location of project: Fuel Processing Facilities Upgrade
Idaho Fuels Processing Facility
INEL, Idaho

2. Project No. 82-D-136

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11. Method of Performance:

Design, construction and procurement will be accomplished by prime contracts and/or subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

A. Total Project Funding	Prior Years	FY-1986	FY-1987	FY-1988	FY-1989	FY-1990	Total
1. Total Facility Cost							
a) Construction Line Item	$18,873	$ 8,500	$ 9,600	$ 6,700	$1,427	$900	$46,000
b) PE&D	0	0	0	0	0	0	0
c) Expense Funded Equipment	0	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0	0
Total Facility Costs	$18,873	$ 8,500	$ 9,600	$ 6,700	$1,427	$900	$46,000
2. Other Project Funding							
a) R&D necessary to complete construction	$ 4,460	$ 0	$ 0	$ 0	$ 0	$ 0	$ 4,460
b) Other Project Related Costs	4,060	640	1,000	700	400	500	7,300
Total Other Project Costs	8,520	640	1,000	700	400	500	11,760
Total Project Costs (Items 1 and 2)	$27,393	$ 9,140	$10,600	$7,400	$1,827	$1,400	$57,760

B. Other Related Funding Requirement	
1. Facility Operating Costs	$ 0*
2. Programmatic Operating Expenses Directly Related to the Facility	0*
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	0*
4. GPP or Other Construction Related to Programmatic Effort in the Facility	0*
5. Other Costs	0*
Total Other Related Annual Funding Requirements	$ 0*

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* Operating costs and programmatic costs for the upgraded processing facility will not change from that presently budgeted for the existing processing facility.

Construction Project Data Sheet

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1. Title and location of project: Fuel Processing Facilities Upgrade
Idaho Fuels Processing Facility
INEL, Idaho

2. Project No. 82-D-136

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

A. Total Project Funding

1. Total Facility
   - a. Construction Line Item - No narrative required
   - b. PE&D - No narrative required
   - c. Expense Funded Equipment - No narrative required
   - d. Inventories - No narrative required

2. Other Project Funding

   a. R&D necessary to complete construction. Approximately $4,460,000 has been expended on conceptual design activities.

   b. Other Project Related Funding - Approximately $7,300,000 will be spent on project support and facility startup. Project Support will extend through design and construction and includes design reviews, independent checks and calculations, trade-off studies, safety analysis report preparation, vendor data reviews and procurement support.

B. Other Related Funding Requirements

No incremental change in funding is required for programmatic operation of the upgraded facility.

Department of Energy
FY 1987 Congressional Budget Request
Adjustments to FY 1986 Appropriations

Defense Waste and Byproducts Management (DP)	FY 1986 Confer.	General Reduction	FTE General Reduction	Gramm-Rudman-Hollings	ES&H Transfer/ Reprogramming	Subtotal	Comparability Adjustments	Adjusted Approp. Total
Operating Expenses:								
Interim Waste Operations	$ 271,000	$ -	$ -	$ -8,479	$ -300	$ 262,221	$ -	$ 262,221
Long-Term Waste Mgmt. Tech.	94,567	-	-	-4,794	-	89,773	-	89,773
Terminal Storage	25,070	-	-	-1,088	-	23,982	-	23,982
Program Direction	2,400	-		-30	-	2,370	-	2,370
Total, Operating Expenses	393,037	-	-	-14,391	-300	378,346	-	378,346
Capital Equipment	35,997	-	-	-2,228	-	33,769	-	33,769
Construction	228,881	-2,025	-200	-11,747	-	214,909	-	214,909
Subtotal, Defense Waste and Byproducts Management	657,915	-2,025	-200	-28,366	-300	627,024	-	627,024
General Reduction:								
Operating Expenses	-	-	-	-	-	-	-	-
Capital Equipment	-	-	-	-	-	-	-	-
Construction	-2,025	+2,025	-	-	-	-	-	-
Total, General Reductions	-2,025	+2,025	-	-	-	-	-	-
FTE Reduction	-200	-	+200	-	-	-	-	-
Use of Prior Year Balances (Defense Waste)								
Operating Expenses	-	-	-	-	-	-	-	-
Capital Equipment	-	-	-	-	-	-	-	-
Construction	-	-	-	-8,600	-	-8,600	-	-8,600
Total, Prior Year Bal. (Defense Waste)	-	-	-	-8,600	-	-8,600	-	-8,600
Total, Defense Waste & Byproducts Mgmt.	$ 656,690	$ 0	$ 0	$-36,966	$ -300	$ 618,424	$ -	$ 618,424
Operating Expenses	393,037	-	-	-14,391	-300	378,346	-	378,346
Capital Equipment	35,997	-	-	-2,228	-	33,769	-	33,769
Construction	226,656	-	-	-20,347	-	206,309	-	206,309

Justification

	FY 1986 Adjusted Appropriation	FY 1987 Request
Operating Expenses	$ 378,346	$ 455,050
Interim Waste Operations	$ 262,221	$ 324,730

The net increase to Interim Waste Operations operating expenses of $62,509,000 includes $13,129,000 for inflation. Programmatic increases and/or decreases and inflationary increases will be described in each subsection below.

The objective of the Interim Waste Operations Program is to provide safe processing and utilization, storage or disposal of Department of Energy (DOE) radioactive waste and byproducts, to support defense nuclear materials production activities, and to implement cost-effective improvements in all of its ongoing and planned activities. The Interim Waste Operations Program is also responsible for the Department-wide transportation management program to meet the radioactive materials packaging and shipping requirements of DOE programs in accordance with national and international policies and regulations. Waste management support is necessary for nuclear material production and naval reactor activities. The program includes the operation and maintenance of HLW storage tanks, bins, and related processing and storage facilities at SR, Richland (RL), and ID; the operation and maintenance of LLW burial grounds at the Savannah River Plant (SRP), Oak Ridge National Laboratory (ORNL), Idaho National Engineering Laboratory (INEL), Hanford Reservation, Los Alamos National Laboratory (LANL), Sandia National Laboratory (SNL), and Nevada Test Site (NTS); the retrievable storage of TRU waste at various sites; the operation of TRU waste certification facilities at several sites; the operation of low-level liquid waste facilities; the operation of three filter testing facilities; and the processing of low-level gaseous effluents. Efforts are also underway to transfer HLW from old tanks at SR and Hanford into new double-shell tanks; to construct new, or improve existing, facilities; to improve burial ground operations; and to stabilize old burial ground areas to minimize the potential for radionuclide release to the environment. In addition, this program provides for the safe management and disposition of surplus radioactively contaminated DOE facilities, at several sites, that were used in support of defense programs.

Operations to process and store or dispose of radioactive waste from DOE defense and R&D programs, including necessary maintenance of facilities and environmental monitoring, must continue in order to assure the safe and environmentally acceptable conduct of DOE's mission. In addition, restoration is necessary to improve safety, to minimize releases of radioactivity to the environment, and to conduct cost-effective "landlord" operations at the Hanford Reservation and the INEL.

The Interim Waste Operations Program will also certify stored TRU waste for acceptance at the WIPP. Since 1980, many newly generated waste forms have been made certifiable for WIPP and stored separately from the backlog of noncertified waste. In 1985, procedures were developed so all routinely generated waste would be certifiable. In addition, as facilities are constructed to prepare TRU waste and HLW for permanent disposal, as described in the DWPF, these facilities will be operated under the Interim Waste Operations Program. This program will transition to a "Waste Operations Program" as more disposal facilities are completed and brought on-line. The Interim Waste Operations Program also supports site-specific technology adaptation efforts, at various facilities, which support and provide improvements to current and planned LLW disposal operations.

In FY 1987, the Interim Waste Operations Program will assume responsibility for the DWPF Saltstone Facility and for preoperational activities in the DWPF glass plant at SR. This facility will incorporate in concrete a decontaminated waste stream from the

HLW tanks for disposal as LLW. Other activities to support the startup of the DWPF vitrification plant will also be continued in FY 1987. This activity began in FY 1986 with support from the DWPF budget. These include the development of procedures, manuals, and the training of operators which must be completed prior to the cold and then hot checkout and startup activities.

	FY 1986 Adjusted Appropriation	FY 1987 Request
a. Idaho National Engineering Laboratory, Idaho	$ 46,180	$ 53,130

The net increase of $6,950,000 in operating expenses at INEL is the result of an inflationary increase of $2,309,000 and program increases of $4,641,000. The program increases consists of $3,662,000 for the PREPP and $979,000 for the Radioactive Waste Management Complex (RWMC), Waste Experimental Reduction Facility (WERF), and New Waste Calcining Facility (NWCF).

The increase of $3,662,000 in FY 1987 is necessary to support the startup of hot operations in the PREPP, which will provide full-scale processing of TRU waste into a form acceptable for emplacement in WIPP.

The requested funds are also required for the continued operation of the INEL RWMC for the receipt, handling, and routine disposal of solid LLW. This includes support for environmental monitoring and surveillance activities at the RWMC and support for remedial actions, if indicated by the monitoring and surveillance programs. Funding is also provided for the continued operation of the NWCF. The funding also supports an extensive program in hazardous waste treatment which will provide or adapt existing waste treatment facilities for various types of site-specific hazardous and mixed waste at INEL. Rock fracturing and excavation to extend the lifetime of the existing burial ground facilities will continue. Operation of the WERF for LLW volume reduction is also included. Groundwater and stack effluent monitoring will also continue in order to assure that there is no significant environmental impact from INEL DP activities.

b. Oak Ridge National Laboratory, Tennessee	$ 18,067	$ 19,900

Increased funding in FY 1987 of $1,833,000, of which $903,000 is due to inflation and the remaining $930,000 is programmatic related, will support efforts to identify and implement technically and environmentally acceptable LLW disposal options for the three Oak Ridge (OR) plants.

Starting in FY 1986, plans are being considered to redirect the DWDM interim operations program at ORNL, and to reprogram the $945,000 design only line item for the Central Waste Disposal Facility (CWDF) (86-D-173) in FY 1987. These actions are necessary to assure continued safe management of both liquid and solid radioactive waste generated at ORNL. No additional funding is requested in FY 1986 for this activity.

The need for the redirection results from recent decisions by the Department to indefinitely defer disposal of liquid waste by hydrofracture, to cancel plans as proposed in a draft Environmental Impact Statement (EIS) issued in September 1984 to develop a CWDF, and to implement new and improved radioactive waste treatment and disposal techniques at ORNL.

Cancellation of the CWDF requires that the $949,000 design only line item be converted to operating funding so that it can be used to develop improved disposal techniques for solid LLW. Some support will be provided by the LLW technology program. The strategy is to assess alternative disposal technologies to shallow-land burial and begin demonstrating the most promising alternatives in FY 1987. Full scale deployment of the preferred disposal technique is planned for the early 1990's.

In FY 1986, a Request for Proposals (RFP) will be issued to obtain disposal concepts from the nuclear industry for the Low-Level Waste Disposal Demonstration (LLWDD). Initial operation of the LLWDD will begin in FY 1987 and full scale operation is planned for the early 1990's.

The requested funds also provide for continued operation of the radioactive waste management facilities at ORNL, including the low-level liquid waste handling and storage system; the laboratory ventilation system for gaseous radioactive effluents; the burial grounds for the receipt, handling, and routine disposal of low-level solid waste; and the storage facility for transuranic solid waste. Also included are supporting activities such as process development, engineering and design studies for waste handling facilities, and support for the Integrated Data Base (the authoritative source of DOE radioactive waste characteristics, inventories, and projections).

The requested funding also continues the liquid and solid waste volume reduction initiatives begun in FY 1986 including efforts to develop cost-effective volume reduction methods and improve waste form stability at ORNL. This activity includes the operation of the electropolishing decontamination facility to decontaminate small items for reuse or disposal as sanitary waste, which might otherwise require disposal as LLW; operation of the TRU waste drum assay facility to segregate low-level and TRU contaminated waste; continuation of generator monitoring efforts to assure proper waste segregation and reduction in the rate of waste generation; and development and characterization of improved grout forms for waste disposal operations at ORNL.

In FY 1987, funding will also support confirmation studies and development of engineering assessments for remedial activities at the existing ORNL burial grounds, in order to reduce the migration of radionuclides to the offsite environment. Burial grounds 4 and 5 (and potentially 6) are suspected of being major contributors to the outfall of radionuclides to White Oak Creek (thence to White Oak Lake and the Clinch River), and contamination of White Oak Lake has been identified by the State of Tennessee as being a high priority item for remedial action. These activities are consistent with the recommendations of the February 1984, "Environmental Management Plan for the Oak Ridge Reservation" (Gore/Lloyd report), which describes proposed solutions and funding for environmental problems that exist at the three Oak Ridge plants.

The requested funding reflects implementation of the new waste management policy adopted by OR in FY 1986 that emphasizes volume reduction to conserve existing disposal capacity and use of interim storage at the Oak Ridge Gaseous Diffusion Plant (ORGDP) until a disposal option is verified for full scale implementation. Included in the new policy is a decision to defer additional hydrofracture injections, develop alternative disposal strategies for liquid radioactive waste at ORNL, and institute a backcharging system to charge waste generating programs for disposal of the waste they generate. In addition, discussions are being held with the Office of Energy Research to reach agreement on the assignment of certain waste management activities to their landlord program, consistent with such assignments at other DOE sites.

	FY 1986 Adjusted Appropriation	FY 1987 Request
c. Hanford Reservation, Washington	$ 86,199	$ 97,280

The net increase of $11,081,000 in operating expenses at the Hanford Reservation, Washington, is comprised of an inflationary increase of $4,325,000 and programmatic increases of $6,756,000, including offsetting reductions of $4,748,000 in other program areas.

Increased funding of $2,293,000 is required in FY 1987 to support operations in B-Plant to fractionate HLW into high-level and low-level components. The high-level component will be stored in new double-shell tanks pending immobilization in the Hanford Waste Vitrification Plant (HWVP) and disposal in a repository. The low-level component will be disposed of as LLW in trenches via grouting using the Transportable Grout Facility. A demonstration of the processing of neutralized current acid waste (NCAW) in B-Plant will be completed, preparatory to full-scale processing in 1988.

Increased funding of $5,261,000 will also support the continued stabilization and isolation of old single-shell tanks. In this effort, supernatant liquid and pumpable interstitial liquid waste is transferred to new double-shell tanks, leaving the crystalline salt cake and sludge (stabilization). Piping and other connections to the old tanks are then sealed to prevent inadvertent intrusion (isolation). The increased funding will support a planned increase in the number of tanks in which pumping operations will begin. The program to stabilize and isolate all 149 old single-shell tanks will be completed in 1992. This funding also supports tank farm operations to perform surveillance and maintenance of the old tanks.

Increased funding of $976,000 will also support planned efforts related to implementation of the Hanford Defense Waste Environmental Impact Statement (HDW-EIS), scheduled for completion in FY 1987. This effort includes supplemental data gathering and technology adaptation, State and public affairs and interaction, and development of a single-shell tank disposal plan. The increase is also required to support vital activities related to Hanford's compliance with Environmental Protection Agency (EPA) and Washington State hazardous waste management regulations under the Resource Conservation and Recovery Act (RCRA). Of primary importance are activities related to permitting the disposal of low-level liquid waste streams via grouting, with the Transportable Grout Facility.

The requested funding is necessary for maintenance and operation of radioactive waste management facilities at the Hanford Reservation. The principal waste management activities include supporting PUREX facility operations; the stabilization and isolation of all 149 old single-shell tanks; the surveillance and maintenance of all waste storage tanks, including 28 new double-shell tanks; operation of waste handling and evaporation facilities; operation of LLW burial grounds for the receipt, handling and disposal of solid LLW; segregation and retrievable storage of TRU solid waste, and operations to make the TRU waste certifiable for WIPP emplacement. The requested funding also supports the operation of B-Plant to begin processing NCAW. An increase of $2,974,000 in FY 1987 will also support operations to dispose of liquid LLW via grouting in trenches with the Transportable Grout Facility.

Also included are support activities such as process development, engineering studies, and conceptual design for improved waste handling practices and facilities; for surveillance of waste management facilities which are no longer in use; and for the cleanup and control of outdoor surface contaminated areas.

Contaminated soil sites, previously used for disposal of liquid waste, are being stabilized to fix radionuclides. Fiscal year 1987 funding supports completion of this program in 1994. Site waste management inventories and process spares are also provided.

	FY 1986 Adjusted Appropriation	FY 1987 Request
d. Savannah River Plant, South Carolina	$ 81,062	$ 118,410

The net increase of $37,348,000 is comprised of an inflationary increase of $4,053,000 and programmatic increases of $33,295,000, including offsetting reductions of $2,869,000 in other program areas.

Most of the increased programmatic funding supports new DWPF-related activities. An increase of $17,000,000 is for training operating personnel, preparation of operating procedures, inspection of materials and equipment, procurement of chemicals and supplies, nonradioactive testing, and record keeping in the DWPF vitrification facility. An increase of $5,600,000 is required for operations to remove salt from double-shell tanks to assure adequate space for storage of waste generated by increased nuclear materials production. The salt will be disposed of as LLW via the DWPF Saltstone Facility. An increase of $5,640,000 is required for preoperational activities to support the scheduled startup of the DWPF Saltstone Facility in FY 1988. An increase of $7,924,000 is required to maintain the waste transfer schedule for removal of waste from old single-shell and badly cracked tanks, and to assure an adequate supply of processed waste feed for the DWPF vitrification facility.

The requested funding is required to continue operation of radioactive waste management facilities at the SRP and to support activities related to future DWPF operations. The principal activities include processing and storage of HLW; surveillance and maintenance of waste tanks and supporting facilities, including operation of the Waste Management Maintenance Facility; waste tank evaluation; waste concentration to reduce waste volume and mobility; transfer of waste from old tanks to new double-shell tanks; low-level liquid effluent waste management; operation of SRP burial grounds for the receipt, handling and disposal of low-level solid waste and the retrievable storage of TRU solid waste, and operations to make the TRU waste certifiable for WIPP emplacement; and support for improved waste handling practices and solid waste volume reduction efforts, including process development, engineering studies, and conceptual design.

The DWPF-related activities include in-tank processing of HLW to prepare feed streams for DWPF; personnel training, and other activities to prepare for DWPF operations; and removal, cementation (via saltstone operations) and disposal of salt from double-shell tanks to optimize waste tank utilization. The DWPF vitrification plant will immobilize the separated high-level fraction of the waste for interim storage onsite and eventual disposal in a geologic repository. The FY 1987 preoperational activities supports the start of hot operations in FY 1990. The original activity related to vitrification operations was funded under the DWPF project in prior years. The DWPF Saltstone Facility will incorporate decontaminated salt solution in concrete for burial onsite as LLW. The FY 1987 funding supports hot operations beginning in FY 1988, which is necessary to assure adequate tank space commensurate with the expected nuclear materials production rate.

The overall schedule for the waste transfer program is maintained; namely, completion of the waste transfer program in FY 1994. Construction of waste transfer facilities on the old waste tanks will continue. Construction of in-tank precipitation facilities to decontaminate salt supernetant will be completed and full scale operation started.

	FY 1986 Adjusted Appropriation	FY 1987 Request
e. Feed Materials Production Center (FMPC), Fernald, Ohio	$ 4,213	$ 5,660

About 20,000 drums of LLW have accumulated in storage at FMPC as of FY 1985. The increase in funding of $1,447,000, of which $211,000 is due to inflation and the remaining $1,236,000 programmatic related, will support processing (as necessary), packaging, transportation and offsite disposal of about 6,000 drums of this backlog. The increase also supports efforts to remove bulk radioactive contamination and hazardous materials from the nearly 8,000 tons of contaminated metal scrap now stored onsite, and from the anticipated large increase in this inventory generated from the Site Productivity Retention Program at the FMPC. After processing, the scrap will be shipped to OR for eventual sorting and size reduction.

The primary mission of the FMPC is to produce uranium billets and target elements for further fabrication and irradiation in the SR and Hanford production reactors. During routine operations, both solid and liquid LLW is generated. Through FY 1983, solid and liquid LLW was stored in open pits. This method of waste storage is no longer acceptable, and has been terminated. In FY 1984, dewatering, as necessary, and onsite storage of the waste in drums began. A decision was made to process, as necessary, all LLW generated at FMPC and transport it offsite for disposal at another DOE facility. Some of the waste can be disposed of with minimal processing, and shipment of this waste began in FY 1985. Some of the waste, requiring further processing, will be processed in temporary facilities and shipped offsite for disposal as it is processed. The bulk of the remainder will await processing in the Low-Level Waste Processing and Shipping System, a permanent facility scheduled to begin operation in FY 1988. At that point in time, all LLW routinely generated at FMPC will be disposed of offsite.

The requested funding also supports several ongoing activities related to the waste previously stored in pits and silos including development of data to support preparation of the FMPC-EIS. These activities include characterization of the waste; maintenance of storage facilities; groundwater monitoring related to the evaluation of contamination caused by leakage, if any; remedial actions, if necessary; and options studies for the final disposal of the waste.

f. Other Sites and Transportation Operations	$ 6,783	$ 7,630

The increased funding of $489,000 in FY 1987 for the LANL, the NTS, and the SNL, including $229,000 for inflation, is mainly to support certification of TRU waste at LANL.

The DOE operates solid radioactive waste management facilities at the NTS, the LANL, and the SNL. The requested funding supports the receipt, processing, and disposal of LLW at these sites and the segregation and retrievable storage of transuranic solid waste at NTS and LANL; the consolidation of disposal sites at NTS; the stabilization of old burial grounds at LANL; the conduct of supporting environmental and other site-specific studies; and the development of procedures to certify that newly generated TRU waste meets the waste acceptance criteria for the WIPP. The funding will also provide modifications to facilities at LANL which will increase the capability to retrieve and certify TRU waste.

The Transportation Operations Management Program is responsible for developing and promulgating DOE packaging and shipping policies and procedures in support of the Department's operational and developmental programs. The increased funding in the Transportation Operations Management Program of $358,000 includes $110,000 due to inflation, and a programmatic increase of $248,000 to continue support of the Departmental Transportation Operations and Traffic Management Program at all sites. The requested funding provides for the following major activities: analyses and negotiation of rates; preparation of data for, and representation at, litigation and rate hearings; transportation regulations development; radioactive and other hazardous materials transportation training programs, including advanced and basic regulations compliance workshops, emergency response orientation, and traffic managers' certification program; data systems to track shipments, collect transportation management information, and to facilitate reporting requirements; the updating and development of informational materials on the DOE shipping program; and management of the explosives classification program. The Transportation Management Program will continue to take actions in FY 1987 that will effect savings of $5-$10 million annually in shipping costs Department-wide.

	FY 1986 Adjusted Appropriation	FY 1987 Request
g. Hanford Reservation, Landlord Support, Washington	$ 2,054	$ 1,700

The net decrease of $354,000 consists of an inflationary increase of $103,000 and a decrease in programmatic requirements of $457,000 reflecting the completion of the expense-funded portion of the upgrade program in FY 1986.

The Hanford landlord program supports maintenance, repair, and improvements in or replacement of general purpose facilities and systems, and equipment at the Hanford Reservation. Responsibilities include utilities, roads, railroads, transportation and other heavy equipment and related facilities. Operating funds are used for general purpose building and equipment maintenance, planning, engineering, and procurement associated with equipment replacement.

At the Hanford Reservation, many of the general support facilities and systems and some of the equipment is old and severely deteriorated. Failures are frequent and downtime is excessive. In FY 1981, an assessment was completed and an upgrade program was begun to restore operational safety, efficiency, and reliability to Hanford general purpose facilities support systems and equipment to complement the base support program at the site. The request supports completion of the upgrade program in FY 1988.

h. Idaho National Engineering Laboratory, Landlord Support	$ 2,479	$ 3,100

The increase in funding of $621,000, consists of $124,000 for escalation and $497,000 for programmatic requirements, to provide additional scheduled maintenance for the most critical facilities and equipment, additional conceptual design to support the increased construction project activity, and an additional seismic monitoring station. The Idaho landlord program supports acquisition of automated data processing equipment, planning and non-programmatic conceptual design related to maintenance, repair, and replacement of general purpose site support facilities such as utilities, roads, service buildings, and site security facilities. In FY 1987, the following computer systems will be initiated at Idaho under lease to ownership arrangement: (1) Computer Aided Engineering (CAE) System, Phase II, estimated at $2,050,000; (2) the Super Computer System, estimated at $750,000, and (3) the Business Computer System Peripheral Upgrade, estimated at $315,000.

However, it should be noted that the actual costs will be shared programmatically according to a charge-back plan based upon utilization. The funding for the CAE System, Phase II, is required to continue the phased acquisition of a computer aided engineering system at INEL. The funding for the Super Computer System will provide for a vector processor with 4 million words of real memory and associated peripheral equipment necessary to meet the growing computational requirements for additional computing capacity and capability at INEL. Funding of the Business Computer System Peripheral Upgrade will provide additional peripherals and real memory, which will ensure that continued support of INEL's business computing needs are adequately met. Much of the general purpose facilities and equipment at INEL fall well below minimum Government standards with respect to both age and physical condition. The requested funding supports an improved degree of compliance with Federal requirements and supports compliance with the DOE policy on maintenance inspections. It also supports landlord-funded inspection, evaluation, and maintenance in the critical area of fire and security alarm systems.

	FY 1986 Adjusted Appropriation	FY 1987 Request
i. Decontamination and Decommissioning	$ 15,184	$ 17,920

In FY 1987, increased funds of $2,736,000, with $759,000 due to inflation, and $1,977,000 relevant to program needs, are allocated to continue 17 ongoing decommissioning projects to control or eliminate hazardous conditions and release facilities and equipment for reuse. Funds are provided to complete the National Environmental Policy Act (NEPA) process and remedial action planning for the Grand Junction Treasure Island Site. Uranium ore residues located there were generated in support of DP activities, and are a source of groundwater contamination. Funds also support characterization and alternatives assessment work for the Waste Holding Basin and the old Hydrofracture Facility waste pond at ORNL, consistent with the Department of Energy Environmental Management Plan for the Oak Ridge Reservation (Gore/Lloyd report).

This program provides for the safe management and disposition of surplus radioactively contaminated DOE facilities originally used in support of defense programs. Approximately 226 defense facilities are now inventoried under this program, including reactors, laboratories, reprocessing plants, and waste storage and disposal facilities, and support structures. All facilities that are to be decontaminated and decommissioned were used for defense activities and most (123) are located at the Hanford Site (Washington). Others are located at ORNL (Tennessee), INEL (Idaho), Mound (Ohio), Knolls Atomic Power Laboratory--Knolls Site (New York), and the New Brunswick Laboratory Site (New Jersey).

Priorities for decontamination and decommissioning will stress the recovery of valuable materials, the beneficial reuse of equipment and facilities, and the avoidance of future maintenance costs while reducing potential health impacts. Since FY 1982, facilities valued at $23.5 million were decontaminated for potential reuse, and by the end of FY 1987 additional facilities will be available for reuse. By performing the decommissioning work, future costs for surveillance and major maintenance will be reduced and facilities and equipment made available for reuse by other Federal programs.

Richland Operations Office, the lead field office for this program, has recently completed a 2-year planning effort with the issuance of the Surplus Facilities Management Program Long-Range Plan. The plan provides a total estimated cost for decommissioning all defense surplus facilities in the inventory, a schedule for performing the work, and estimates of waste volumes that will be generated. The total estimated cost for decommissioning all surplus facilities in the defense inventory approximates $700 million, and the scheduled completion date is 2005. Project schedules, costs, and waste volumes are based on projected disposition modes and optimizing funding profiles at each of the sites. The long-range planning information will be updated annually and will be based on the most current budget guidance.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Long-Term Waste Management Technology	$ 89,773	$ 88,820

The net decrease in Long-Term Waste Management Technology operating expenses of $953,000 includes inflation of $4,489,000. The programmatic increases and/or decreases and inflationary increases will be described in each subsection below.

The Long-Term Waste Management Technology Program is directed toward the long-term management of DOE radioactive wastes including an integrated transport system. The program consists of developing technologies for each waste type and assessing the associated hazards, costs, and environmental impacts in order to select and implement long-term disposition alternatives. The Long-Term Waste Management Technology Program also includes activities for hazardous chemical defense waste to respond to the increased attention at DOE sites in managing such waste in compliance with appropriate EPA regulations (RCRA/Comprehensive Environmental Response, Compensation and Liability Act [CERCLA]). In FY 1987, the program will continue to focus on construction of the DWPF at SR, conceptual design of a vitrification facility for Hanford, and engineering studies for TRU waste processing facilities.

a. High-level waste technology	$ 58,118	$ 57,228

The decrease in HLW technology is comprised of an increase of $2,906,000 for inflation and a reduction in programmatic activities of $3,796,000.

The net reduction of $890,000 in HLW technology funding requirements is primarily due to completion of major tasks during FY 1986 in the DWPF technical support effort.

The objective of this program is the long-term disposal of HLW at SR, Hanford, and ID. The FY 1987 program continues the sequential approach for HLW management with SR first and efforts at Hanford increasing to support implementation of waste disposal strategies. Activities at ID will be limited to alternative and technical feasibility studies of volume reduction technologies for future consideration.

Savannah River - This program directly supports the disposal of SR waste including liaison with the design and construction of the DWPF. Engineering studies and process and equipment demonstrations will support and verify cost-effective design for the DWPF. Standard test methods will be used to characterize waste forms and canisters in order to evaluate these properties against repository criteria and standards. Liaison will continue with the Office of Civilian Radioactive Waste Management (OCRWM) to assure close coordination with the civilian repository program. Comparisons of glass production rates for simulated and actual waste feeds have been completed. Interim requirements for the acceptance of DWPF glass will be completed for disposal in various geologic repository media. The preliminary report for large scale glass leaching studies has been completed and the final report will be issued. Standardized test methods for waste qualification testing have been initiated. In FY 1987 the HLW program efforts will provide testing to support acceptance of DWPF waste in salt, basalt, and tuff. Characterization of site specific waste package performance will be ascertained under simulated repository conditions.

Defense Waste Processing Facility - Technical support activities are required during design and construction of the DWPF to reduce project risk and minimize startup and operational problems. Integrated testing of melter feed, melter operation and melter offgas systems on small (1/10) scale but highly prototypical equipment with flow sheet quantities of halides and mercury will provide essential data for DWPF startup. Waste characterization and frit optimization efforts will continue to support upcoming operation of the DWPF. Documentation will be prepared to support startup and operating procedures. Also provided are DWPF plant liaison, design and construction checking, engineering tradeoff studies, and other High-Level Waste Technology Program efforts that support startup and operation of the DWPF Saltstone Facilities in FY 1988 and sludge vitrification in early FY 1990.

Hanford - The Hanford Defense Waste EIS to support selection of a disposal strategy for Hanford high-level and TRU wastes will be completed and a Record of Decision issued in FY 1987. Planning, process development and engineering evaluations will continue to support the permanent disposal of Hanford waste. Processes and engineered barriers for the in-place stabilization and disposal of existing waste at sites from which retrieval of the waste might not be warranted, are being developed, and their long-term performance evaluated. Engineered barriers are being designed to preclude or mitigate the consequences of, tank dome subsidence, intrusion of groundwater, radionuclide uptake by deep-rooted plants and excavation by burrowing animals. A demonstration of technology (barrier, etc.) required for the in-place stabilization and disposal of Hanford single-shell tank wastes will be performed. Operation of the tank mockup facility for supporting the in-place disposal demonstration has been initiated. Sampling and characterization of waste in the TY tank farm where the in-place disposal test is planned will be completed. During FY 1987, preparation will be made to initiate dome fill of one TY tank as a single-shell tank disposal test. General criteria for the safe and environmentally sound approach to in-place disposal for single-shell tank waste will be completed. Predictive models to simulate radionuclide transport by groundwater in the unsaturated zone will be completed for in-place disposal. To prepare double-shell tank waste for disposal in grout or glass, feed pretreatment technology will be developed to include: development of improved methods for sampling tank wastes; identification of waste for sampling and analysis; and development of analytical methods. In addition, NCAW and complexant concentrate waste pretreatment flowsheets will be developed.

Hanford Waste Vitrification Plant - Conceptual design, process development, and engineering research and development will continue in FY 1987 for an immobilization facility to prepare Hanford HLW for permanent disposal in a geologic repository. The facility is planned to be built in conjunction with the existing B-Plant. Existing technology and design data from DWPF will be used to the maximum extent practical to reduce cost and duplication of effort. Basic process requirements are similar to the SR DWPF except that an existing waste preparation facility (B-Plant) will be used instead of in-tank processing. The LLW salt fraction will be decontaminated and incorporated in grout for near surface burial. The sludge fraction and radionuclides removed from the salt will be vitrified for geological repository disposal. The architect/engineer (A/E) will be selected in FY 1986 and will complete the conceptual design and start the pre-title I design modifications in FY 1987.

Idaho - Planning and evaluation of alternatives for disposal of Idaho Chemical Processing Plant (ICPP) waste will continue in order to develop cost-effective permanent disposal options leading toward the selection of a waste management strategy for ICPP waste in FY 1992. Efforts are oriented toward completing a plan to demonstrate the technical feasibility of a selected long-term waste management strategy consistent with goals of the DWMP. Limited feasibility studies for developing immobilization forms with a high loading of ID HLW will be continued in FY 1987. Cost trade-off studies for options to reduce the volume of ID HLW for the basic disposal strategies will be reported. Risk analysis and regulatory impacts associated with disposal options for stored ID HLW calcine will be reported in FY 1986 and used, beginning in FY 1987, to identify a reference long-term disposal option.

	FY 1986 Adjusted Appropriation	FY 1987 Request
b. Transuranic waste technology	$ 11,373	$ 12,930

The net $1,557,000 increase, $569,000 due to inflation and $988,000 associated with programmatic requirements, in FY 1987 funding is required to provide certified wastes for emplacement in WIPP, including system integration and certification of remote-handled and special case waste.

Technology for permanent disposal of TRU waste, and implementation of the DWMP and DOE requirements for managing TRU waste (DOE Order 5820.2) will continue. Technology and related tasks include continued operational testing of the prototype transport system (TRUPACT) for contact-handled waste; development of a remote-handled waste transport system; system integration, modeling, and analysis; transfer of PREPP technology to other sites; development of equipment, facilities, and certification technology for the remote-handled waste disposal demonstration in WIPP; development of certification technology and facilities for special case and remote-handled waste, including start of SWEPP and PREPP enhancements; demonstration and verification of mobile Non-destructive Examination and Assay (NDE/NDA) Systems for cost-effective waste certification at small generators; continuation of reduced waste generation technology development; and continued development of buried waste and in-situ vitrification technology. These efforts will directly support the orderly implementation of the DWMP and DOE Order 5820.2.

	FY 1986 Adjusted Appropriation	FY 1987 Request
:. TRU waste processing facilities	$ 4,411	$ 2,115

The net decrease of $2,296,000 is due to the completion of PREPP ($-2,915,000) and SWEPP ($-198,000) and offsetting increases in the waste processing facilities ($+596,000) and inflation ($+221,000).

TRU wastes at RL, SR, and OR will require processing to meet WIPP waste acceptance criteria. Cost/schedule optimization activities comparing centralized with decentralized processing facilities will determine whether an existing facility (for example, SWEPP/PREPP with modification) could be used, or if each of the three sites should process waste on site. The FY 1987 program will enable engineering evaluation of site specific facilities to be conducted, for example, the Transuranic Waste Facility (TWF) at SR and the Waste Receiving and Processing Plant (WRAP) Facility at RL.

	FY 1986 Adjusted Appropriation	FY 1987 Request
. Low-level waste technology	$ 3,982	$ 5,725

In addition to the $199,000 inflationary increase in FY 1987, an increase of $1,544,000 is needed to continue support of LLW disposal site operations and technology application, thereby assuring that evolving Federal and State standards and issues are satisfied.

The objectives of this generically applied LLW technology program are to: (1) improve techniques for disposal by shallow-land burial including methods for accurate prediction through adequate monitoring and modeling; (2) provide supporting documentation in assuring compliance with DOE criteria for disposal by shallow-land burial: (3) develop cost-effective treatment processes to stabilize certain LLW streams and reduce volumes by generation avoidance; and (4) evaluate disposal concepts, such as greater confinement, for application at DOE sites.

The LLW program was begun in FY 1977 to improve shallow-land burial technology and now includes waste treatment, corrective measures, and alternative or greater confinement disposal techniques. A LLW classification system which provides a hazard index based on risk to man was developed to facilitate treatment, handling, and disposal. Various demonstrations of improved disposal and treatment technologies have been conducted and documented in handbooks. Supporting documentation to provide suggested technical guidelines was prepared for additional reference. A proposed methodology for threshold limits for LLW disposal, final airborne waste tasks for high temperature filter and filter monitoring, and assessment of treatment and forms for problematic wastes were completed. In FY 1986 limited field testing for shallow-land burial improvements, testing of waste source leaching mechanisms, limited development for corrective measures and treatment processes, and development of a handbook on alternative disposal technologies, development of engineered sorbent barrier for shallow-land burial, and small-scale testing of stabilization and closure of shallow-land burial sites will be completed. In FY 1987 funds will be provided for increased emphasis on demonstrating disposal site closure technology to reduce long-term active maintenance costs; development of disposal technology to improve liquid LLW disposal practices; evaluations of enhancements for problem wastes; and systems evaluation for overall performance assessment.

	FY 1986 Adjusted Appropriation	FY 1987 Request
e. Hazardous chemical defense waste technology	$ 5,280	$ 5,822

Besides an inflationary increase of $264,000 in FY 1987, the programmatic increase of $278,000 essentially continues the FY 1986 activities.

The objectives of this hazardous waste technology application program are the identification and application of existing techniques in handling hazardous waste and environmental restoration of inactive hazardous waste sites. Program elements consist of waste generation reduction, waste treatment, chemical recycle and utilization, disposal alternatives, monitoring and modeling, and environmental restoration. In FY 1986 tasks were initiated for development of hazardous waste inventory and technology data bases and technology demonstration and application emphasizing treatment processes which would eliminate waste streams or bring them into compliance with hazardous waste regulations. In FY 1987, the program will complete conceptual design and bench scale testing of treatment of nitrates, preliminary testing of acceptable monitoring techniques for organic hazardous wastes, and processes for cleanup and reclamation of waste acids.

f. Transportation research and development	$ 6,609	$ 5,000

The decrease in FY 1987 reflects an inflationary increase of $330,000, with a corresponding program decrease of $1,939,000.

The net decrease of $1,609,000 in FY 1987 reflects the continuation of transportation research and development at a minimal level to meet priority DP needs.

The nuclear materials transportation program is responsible for the planning, design, development, and testing of integrated transport systems which meet Department-wide nuclear material transportation requirements. Transportation system, packaging, and materials development and testing is conducted to ensure that safe, efficient, and cost-effective transportation is available to support DOE operational needs. The program also provides transportation technology input to facility designs and environmental and safety analysis for DOE nuclear programs, and to Department of Transportation (DOT) and Nuclear Regulatory Commission (NRC) transport regulation development.

In FY 1987 work will continue to develop applied technology supporting the development of urgently needed DP transportation systems and equipment. The work will include benchmarking of analytical codes for use in shipping container designs, and definition of design environments.

Work will also be conducted on the effects of packaging hardness and target hardness on the consequent release of contents, if any, subsequent to impact. Work will continue at a minimal level in the support of upgrading consensus standards through ASME, ANSI, etc., the development of risk analysis and safety assessment parameters, operation and maintenance of transportation data bases and models and information services on shipments, incidents, packaging, routing, State and local legislation, etc. Other work in scale-model and full-scale testing (thermal/structural and normal/accident conditions), cost-saving designs component improvement (such as seals, tiedowns, impact limiters, containment filters, and radiation shields), and facilities/package interface standardization will also be covered.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Terminal Storage	$ 23,082	$ 38,150

In addition to an inflationary increase of $1,190,000 in FY 1987, the remaining increase of $13,878,000 in operating funds is required as the project transitions from construction to operations. As facilities and installed equipment are completed and turned over to DOE, preoperational testing, startup and checkout, training activities, and staffing for the demonstration phase will begin. Baseline construction is scheduled to be completed in December 1988. Hot operations are scheduled to begin in October 1988. WIPP operations are, however, dependent on a legislative withdrawal of the Federally owned site for exclusive DOE use for waste disposal. The Department of Interior is expected to submit this legislation during FY 1986.

The WIPP, located in Eddy County about 25 miles east of Carlsbad, New Mexico, will provide an R&D facility for demonstrating the safe disposal of defense TRU waste and for conducting R&D on various types of defense HLW in a stable geologic environment. The TRU waste will remain retrievable for up to 5 years, after which time a determination will be made whether it will be allowed to remain in the WIPP in perpetuity. The HLW used for experiments will be retrieved and removed from the site prior to decommissioning of the WIPP facility. Construction of permanent surface and underground facilities is proceeding on a phased basis, consistent with the evaluation of data obtained during the now completed exploratory program which was defined in the Final EIS.

The WIPP R&D program includes in-situ experiments and demonstrations to resolve technical issues about the disposal of radioactive waste in bedded salt. The R&D program is organized into three general areas; site characterization and evaluation, repository development, and waste package interactions. The tests are designed to extend the current knowledge about the interactions of materials and systems under actual environmental conditions. Data obtained from the experiments will be used to validate performance assessment techniques and models and to confirm facility designs and operations.

Program Direction	$ 2,370	$ 2,400

The increase in FY 1987 of $30,000 will provide sufficient funding to support DOE Headquarters' personnel.

Program direction funds provide for the salaries, benefits, training, and travel expenses for [illegible] full-time equivalent (FTE) personnel associated with managing the [illegible] program at DOE Headquarters. These employees are responsible for the administrative and technical support for program activities such as providing direction and control to the multiple DOE field installations involved in the program, interacting with other Federal agencies and State and local governments, and participating in the budget execution and formulation process including congressional authorization and appropriation hearings. The technical direction and administration of the broad and complex group of [illegible] activities with a small headquarters staff requires maximum utilization of available personnel. The technical management staff devotes primary attention to major program activities, such as: (1) the operation of [illegible] waste management systems at DOE nuclear installations; (2) R&D for the long-term management of radioactive wastes; (3) support of major projects including the DWPF at Savannah River, South Carolina, and the WIPP project near Carlsbad, New Mexico; and (4) Departmental-wide transportation operations and traffic management including package certification.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Capital Equipment	$ [illegible]	$ [illegible]

Equipment funding is distributed by major program area as shown below:

Interim Waste Operations	$ [illegible]	$ [illegible]
Long Term Waste Management Technology ...	[illegible]	[illegible]
Terminal Storage	[illegible]	[illegible]
Total	$ [illegible]	$ [illegible]

The increase in FY 1987 capital equipment request of $[illegible] is due to inflation, $[illegible], and program needs, $[illegible].

The increase in Interim Waste Operations funding of $[illegible] is comprised of $[illegible] for inflation and $[illegible] for programmatic activities to support preoperational activities in the DWPF.

The requested Interim Waste Operations equipment funding provides essential equipment to support landlord responsibilities at [illegible] and to support interim waste operations efforts at ID, SR, [illegible], Hanford, [illegible], and [illegible].

The Interim Waste Operations Program is responsible for providing site landlord support and transportation equipment at the Hanford Reservation and at [illegible]. Examples of equipment necessary to support this activity are data processing equipment for centralized computer center operations, [illegible] equipment, light and heavy automotive equipment, heavy equipment such as cranes, bulldozers, [illegible], and [illegible], safety, [illegible], and communications equipment, and general [illegible] office equipment. The requested funding supports the continuation of equipment upgrades to ensure the safety and reliability of [illegible] general support facilities and equipment at the Hanford and Idaho landlord Programs.

The funding will provide replacement items that are important to the safety and reliability of continued waste operations at DOE sites. These equipment items consist of items with a life span of several years for which repair or rebuild costs exceed the purchase price and existing deteriorated and obsolete items that require replacement. Failure of existing equipment to [illegible] and [illegible] costs in conjunction with the [illegible] to [illegible] personnel and [illegible]. In many instances, parts are no longer available and equipment replacement is more cost-effective than repair.

and to Department of Transportation (DOT) and Nuclear Regulatory Commission (NRC) transport regulation development.

In FY 1987 work will continue to develop applied technology supporting the development of urgently needed DP transportation systems and equipment. The work will include benchmarking of analytical codes for use in shipping container designs, and definition of design environments.

Work will also be conducted on the effects of packaging hardness and target hardness on the consequent release of contents, if any, subsequent to impact. Work will continue at a minimal level in the support of upgrading consensus standards through ASME, ANSI, etc., the development of risk analysis and safety assessment parameters, operation and maintenance of transportation data bases and models and information services on shipments, incidents, packaging, routing, State and local legislation, etc. Other work in scale-model and full-scale testing (thermal/structural and normal/accident conditions), cost-saving designs component improvement (such as seals, tiedowns, impact limiters, containment filters, and radiation shields), and facilities/package interface standardization will also be covered.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Terminal Storage	$ 23,982	$ 38,100

In addition to an inflationary increase of $1,100,000 in FY 1987, the remaining increase of $13,018,000 in operating funds is required as the project transitions from construction to operations. As facilities and installed equipment are completed and turned over to DOE, preoperational testing, startup and checkout, training activities, and mining for the demonstration phase will begin. Baseline construction is scheduled to be completed in December 1988. And operations are scheduled to begin in October 1988. WIPP operations are, however, dependent on a legislative withdrawal of the federally owned site for exclusive DOE use for waste disposal. The Department of Interior is expected to submit this legislation during FY 1986.

The WIPP, located in Eddy County about 25 miles east of Carlsbad, New Mexico, will provide an R&D facility for demonstrating the safe disposal of defense TRU waste and for conducting R&D on various types of defense HLW in a stable geologic environment. The TRU waste will remain retrievable for up to 5 years, after which time a determination will be made whether it will be allowed to remain in the WIPP in perpetuity. The HLW used for experiments will be retrieved and removed from the site prior to decommissioning of the WIPP facility. Construction of permanent surface and underground facilities is proceeding on a phased basis, consistent with the evaluation of data obtained during the now completed exploratory program which was defined in the Final EIS.

The WIPP R&D program includes in-situ experiments and demonstrations to resolve technical issues about the disposal of radioactive waste in bedded salt. The R&D program is organized into three general areas; site characterization and evaluation, repository development, and waste package interactions. The tests are designed to extend the current knowledge about the interactions of materials and systems under actual environmental conditions. Data obtained from the experiments will be used to validate performance assessment techniques and models and to confirm facility designs and operations.

Program Direction	$ 2,370	$ 2,400

The increase in FY 1987 of $30,000 will provide sufficient funding to support DWTM Headquarters' personnel.

Program direction funds provide for the salaries, benefits, training, and travel expenses for 61 full-time equivalent (FTE) personnel associated with managing the DWBM program at DOE Headquarters. These employees are responsible for the administrative and technical support for program activities such as providing direction and control to the multiple DOE field installations involved in the program; interacting with other Federal agencies and State and local governments; and participating in the budget execution and formulation process including congressional authorization and appropriation hearings. The technical direction and administration of the broad and complex array of DWBM activities with a small Headquarters staff requires maximum utilization of available personnel. The technical management staff devotes primary attention to major program activities, such as: (1) the operation of radioactive waste management systems at DOE nuclear installations; (2) R&D for the long-term management of radioactive wastes; (3) support of major projects including the DWPF at Savannah River, South Carolina, and the WIPP project near Carlisbad, New Mexico; and (4) Department-wide transportation operations and traffic management including package certification.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Capital Equipment	$ 33,769	$ 37,805

Equipment funding is distributed by major program area as shown below:

Interim Waste Operations	$ 27,885	$ 31,615
Long Term Waste Management Technology ...	5,594	5,890
Terminal Storage	290	300
Total	$ 33,769	$ 37,805

The increase in FY 1987 capital equipment request of $4,036,000 is due to inflation, $1,686,000, and program needs, $2,350,000.

The increase in Interim Waste Operations funding of $3,730,000 is comprised of $1,392,000 for inflation and $2,338,000 for programmatic activities to support preoperational activities in the DWPF.

The requested Interim Waste Operations equipment funding provides essential equipment to support landlord responsibilities at ID and Hanford and to support Interim Waste Operations efforts at ID, OR, Albuquerque (AL), Hanford, Nevada (NV), Fernald, and SR.

The Interim Waste Operations Program is responsible for providing site landlord support and transportation equipment at the Hanford Reservation and at INEL. Examples of equipment necessary to support this activity are data processing equipment for centralized computer center operations; computer-aided design drafting and engineering equipment, light and heavy automotive equipment; heavy equipment such as cranes, bulldozers, scrapers, graders, and trailers; safety, laboratory, and communications equipment; and general purpose office equipment. The requested funding supports the continuation of equipment upgrades to restore the safety and reliability of badly deteriorated general support facilities and equipment in the Hanford and Idaho Landlord Programs.

The funding will provide replacement items that are important to the safety and reliability of continued waste operations at DOE sites. These equipment needs consist of items with a life span of several years for which rental or lease costs exceed the purchase price and existing deteriorated and obsolete items that require replacement. Failure of existing equipment is frequent and maintenance costs in conjunction with the attendant radiation exposure to maintenance personnel are not acceptable. In many instances, parts are no longer available and equipment replacement is more cost-effective than repair.

Capital equipment is required for surveillance of HLW tanks and for operational and maintenance activities associated with waste transfer, concentration, and solidification, and management of liquid waste streams at Hanford, OR, and SR. Equipment is also required for solid radioactive waste storage and disposal operations at all DOE sites. This includes the receipt, handling, and disposal of solid low-level radioactive waste, and the segregation and retrievable storage of TRU solid waste. Typical examples of the equipment used include: manipulators, pumps, motors, agitators, in-cell hoists, filters, leak detection equipment, handling devices, earth-moving equipment, soil moisture probes, waste evaporator parts, valves, laboratory apparatus, equipment for process development and testing, radiation monitoring instruments, and compactors and other volume reduction instruments. Equipment is also required to support decontamination and decommissioning projects, and includes radiation survey instrumentation, pumps, motors, heavy duty cutting equipment, and a conveyor system. Requirements also exist at Hanford to purchase a concrete batch plant in the 100-Areas to support decommissioning of the shut-down production reactors.

The increase of $306,000 in FY 1987 Long-Term Waste Management Technology and Terminal Storage equipment funding is almost entirely due to escalation and is required primarily to support the hazardous waste program. Long-term waste management technology major equipment requirements include: laboratory and analytical equipment for waste characterization, feed preparation, and hot cell testing; low efficiency gamma detectors and neutron generators; an equipment storage enclosure; and a mobile decontamination station. Smaller items are also required such as a pressure transmitter and calibrator, double wide glove box, specimen preparation equipment for a hot cell, and calcined waste handling and compaction equipment. In addition, equipment and instrumentation is required to develop accurate assay certification data for remote handled TRU waste, and the mobile assay system. Pilot scale acid waste detoxification and reclamation system and a process pilot plant for hazardous waste will be built. Hardware for operational tests for radioactive material shipment containment systems, leach testing, nondestructive testing, and other equipment is needed to assure operational performance of hardware for certification. Additional test equipment to perform full scale testing of new design for thermal, mechanics, and puncture environmental capabilities will be provided.

Shipments of TRU waste to WIPP will be made using the TRUPACT (Transuranic Package Transporter). Procurement activities for the TRUPACT fleet will continue in FY 1987 with capital equipment funds reprogrammed from WIPP construction funds in FY 1986. These activities include design, safety analysis and certification, limited long-lead material procurement, and preparing the assembly facility. A funding request will be made in FY 1988 to begin full procurement and assembly of TRUPACTS.

CONSTRUCTION PROJECTS OVERVIEW

		TEC	FY 1986 Adjusted Appropriation	FY 1987 Request
87-D-171	General plant projects, Interim Waste Operations, various locations	$ N/A	$ 23,453 a/	$ 26,535
87-D-172	WESF K-3 Filter Upgrade, Richland, WA	3,300	0	500
87-D-173	242-A Evaporator/Crystallizer Upgrade, Richland, WA	12,600	0	2,800

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a/ FY 1986 GPP (86-D-171) shown for comparability purposes.

CONSTRUCTION PROJECTS OVERVIEW (cont'd)

		TEC	FY 1986 Adjusted Appropriation	FY 1987 Request
87-D-174	241-AQ Tank Farm, Richland, WA	$ 58,000	$ 0	$ 2,100 b/
87-D-175	Steam System Rehabilitation, Phase I, Richland, WA	13,500	0	900
87-D-177	TRA Liquid Radioactive Waste Cleanup, Phase III, INEL, ID	5,500	0	700
87-D-180	Burial Ground Expansion, Savannah River, SC	14,500	0	6,300
87-D-181	Diversion Box and Pump Pit Containment Buildings, Savannah River, SC	17,300	0	1,360
86-D-172	B-Plant F-Filter, Richland, WA	4,[illegible]	949	3,000
86-D-173	Central Waste Disposal Facility, Design-Only, Oak Ridge, TN	1,000	949 c/	0
86-D-174	Low-Level Waste Processing and Shipping System, Feed Materials Production Center, Fernald, OH	17,000	2,372	10,000
86-D-175	INEL Security Upgrade, INEL, ID	10,000	1,958	7,300
85-D-157	7th Calcined Solids Storage Facility, INEL, ID	23,300	13,319	800
85-D-158	Central Warehouse Upgrade, Richland, WA	13,000	4,744	1,300 d/
85-D-159	New Waste Transfer Facilities, H-area, Savannah River, SC	41,000	8,118	8,200
85-D-160	Test Reactor Area Security System Upgrade, INEL, ID	7,000	2,203	2,750

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b/ Assumes $1,200,000 will be provided in FY 1987 through reprogramming from Project No. 82-N-104, $67,000; Project No. 82-N-107, $550,000; and Project No. 83-D-157, $583,000.

c/ Assumes this funding will be reprogrammed in FY 1987 to operating dollars for the Low-Level Waste Disposal Demonstration (LLWDD) at OR.

d/ Assumes $4,200,000 will be provided in FY 1987 through reprogramming from Project No. 83-D-157.

		TEC	FY 1986 Adjusted Appropriation	FY 1987 Request
82-N-103	Waste Handling and Isolation Facilities, Richland, WA	34,450	2,069	2,000
81-T-105	Defense Waste Processing Facility, Savannah River, SC	870,000	155,400 e/	135,000
Reductions from prior years construction projects			-9,225	0
TOTAL CONSTRUCTION			$ 206,309	$ 211,545

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e/ Tentative allocation of $1,600,000 general reduction pending review of other projects.

		FY 1986 Adjusted Appropriation	FY 1987 Request
87-D-171	General plant projects (GPP), Interim Waste Operations, various locations	$ 23,453	$ 26,535

In addition to an inflationary increase of $1,171,000, a programmatic increase of $1,911,000 is required primarily to support the FMPC. This increase is vitally needed to meet immediate requirements for waste storage, processing and decontamination facilities. Included are facilities for storage of contaminated rubble generated by the Nuclear Materials Production program and for storage of contaminated oil, a graphite crucible incinerator which will meet current environmental standards, and an equipment decontamination facility. Refer to the GPP construction data sheet for specific examples of projects.

The funding is for various projects including construction, additions, upgrading, and replacement items that are required because of deterioration, obsolescence or increased waste storage or disposal requirements at the AL, Hanford, ID, OR, Fernald, and SR sites. They are necessary to meet critical health, safety, and environmental needs in landlord support and in waste management operational activities. Also included is funding for emergency repairs to sustain normal operations.

87-D-172	WESF K-3 Filter System Upgrade Richland, Washington	$ 0	$ 500

This project will provide for the design and construction of a new HEPA filter system which will permit the K-3 duct to be decontaminated without overloading the HEPA filter system. The filter enclosure will also be structurally upgraded to allow changeout without environmental release of radioactive contamination. The duct is highly contaminated (160-760 R/hr), and the system is incapable of handling a large radionuclide loading without environmental release if the contamination in the duct migrates to the filter system.

		FY 1986 Adjusted Appropriation	FY 1987 Request
87-D-173	242-A Evaporator/Crystallizer Upgrade, Richland, Washington	$ 0	$ 2,800

This project will provide for the design and construction of upgrades to the existing (and only) high-level liquid waste evaporator in the Hanford Waste Management Complex. The existing facility is approaching its design lifetime and operating efficiency and throughput are decreasing steadily. The upgrade will extend the life of the 242-A evaporator through the year 2000 and will double the operating efficiency. Without the planned upgrade, the evaporator efficiency is projected to drop less than 40 percent by the year 1990. Without this project, HLW volume will continue to increase, requiring additional HLW storage capacity.

		FY 1986 Adjusted Appropriation	FY 1987 Request
87-D-174	241-AQ Tank Farm, Richland, Washington	$ 0	$ 2,100 a/

This project provides for the design and construction of four aging (high-heat) HLW storage tanks and associated piping, pumps and supporting systems, and the conversion of an existing double-shell waste storage tank to an aging waste tank. The tanks are needed to assure continued support for PUREX operations and to support B-Plant waste pretreatment operations. Current waste generation forecasts indicate that present storage capacity will be inadequate to meet these needs by the early 1990's.

		FY 1986 Adjusted Appropriation	FY 1987 Request
87-D-175	Steam System Rehabilitation, Phase I, Richland, Washington	$ 0	$ 900

This project is the first phase of a projected two phase effort to upgrade or replace existing 40 year old power houses. Phase I includes construction of a new steam tie-line capable of transferring steam between the existing 200 East and 200 West steam generation and distribution systems.

		FY 1986 Adjusted Appropriation	FY 1987 Request
87-D-177	Test Reactor Area (TRA) Liquid Radioactive Waste Cleanup System, Phase III, INEL, Idaho ...	$ 0	$ 700

This project will eliminate the discharge of radioactively contaminated waste water to the soil at INEL. The annual discharge contains up to 300 Curies of tritium and 50 Curies of other radionuclides. The currently-used seepage basin will be replaced by process equipment to maximize recycle, and a plastic-lined evaporation pond for the residual effluent.

		FY 1986 Adjusted Appropriation	FY 1987 Request
87-D-180	Burial Ground Expansion, Savannah River, South Carolina ...	$ 0	$ 6,300

This project will provide an approximately 100 acre expansion to the existing burial ground to meet forcasted needs through 2008. It will include greater confinement demonstrations of grouted boreholes and an engineered trench which will provide improved containment of tritium and other radionuclides. Also included in the project is heavy equipment for earth moving and waste container handling.

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a/ Assumes $1,200,000 will be provided in FY 1987 through reprogramming from Project No. 82-N-104, $67,000; Project No. 82-N-107, $550,000; and Project No. 83-D-157, $583,000.

		FY 1986 Adjusted Appropriation	FY 1987 Request
87-D-181	Diversion Box and Pump Pit Containment Buildings, Savannah River, South Carolina ...	$ 0	$ 1,360

This project will provide enclosures over five pump pit and diversion box facilities in the HLW tank farm to allow operations to continue unaffected by weather conditions and to facilitate more efficient use of the facilities with decreased worker exposure to radiation. It is needed because of large increase in the amount of liquid waste handled.

86-D-172	B-Plant F-filter, Richland, Washington	$ 949	$ 3,000

This project will provide a sixth air filter cell (F-filter) to serve B-Plant. This filter will be an underground concrete cell equipped with prefilters, high efficiency particulate air filters, and an emergency back-up sand filter. F-filter will incorporate features which will help assure an estimated service life in excess of 15 years.

86-D-173	Central Waste Disposal Facility, Oak Ridge, Tennessee	$ 949 a/	$ 0

This project provides for the design of a disposal facility for solid low-level radioactive waste generated by all three plants on the Oak Ridge Reservation. The facility will be designed to replace existing individual plant disposal facilities, all of which will be exhausted or closed by FY 1990.

Starting in FY 1986, plans are being considered to redirect the DWBM's interim operations at ORNL and to reprogram the $949,000 design only line item for the CWDF in FY 1987. The need for this redirection results from recent decisions by the Department to indefinitely defer disposal of liquid waste by hydrofracture, to cancel plans as proposed in a draft EIS issued in September 1984 to develop a CDWF and to implement new and improved radioactive waste treatment and disposal techniques at ORNL. Cancellation of the CWDF requires that the $949,000 design only line item be converted to operating funds so that it can be used to develop improved disposal techniques for solid LLW.

86-D-174	Low-level Waste Processing and Shipping System, Feed Materials Production Center, Fernald, Ohio .	$ 2,372	$ 10,000

This project will provide facilities to process liquid and solid LLW into a stable form for offsite disposal at another DOE facility. The system includes filters, waste conveyors, dryers, crushers, mills, packaging and shipping facilities, and associated decontamination, surveillance and pollution control systems.

86-D-175	INEL Security Upgrade, INEL, Idaho	$ 1,958	$ 7,300

This project provides for design, procurement, and construction to upgrade guard stations at separate locations of the INEL to meet DOE security requirements. The facility upgrades will include a main guard station, access control stations, a new security administration building, and a Special Response Team (SRT) Headquarters facility.

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a/ Assumes this funding will be reprogrammed in FY 1987 to operating dollars for the LLWDD.

		FY 1986 Adjusted Appropriation	FY 1987 Request
85-D-157	Seventh Calcined Solids Storage Facility, INEL, Idaho	$ 13,319	$ 800

This project provides for the design and construction of a storage facility for 65,000 cubic feet of granular HLW solids (calcine) produced by the NWCF, located at the ICPP. The NWCF processes the liquid HLW, generated primarily from reprocessing spent naval reactor fuels, into a form suitable for extended storage.

85-D-158	Central Warehouse Upgrade, Richland, Washington	$ 4,744	$ 1,300 a/

This project replaces the current dilapidated warehouse, built in the early 1950's, with a new facility which will provide 133,000 square feet of warehouse space and 22,000 square feet of office space. In addition, a separate building of 5,000 square feet will be built for storage of flammable materials and liquids.

85-D-159	New Waste Transfer Facilities, Savannah River, South Carolina ...	$ 8,118	$ 8,200

This project will replace the existing deteriorated H-Area Diversion Box #2 transfer facility with one of current design. The new facility, which is designed to transfer waste between the east and west H-Area tank farms, and between F- and H-Areas, will have the capability to expand to meet future needs, including accommodating DWPF feed and recycle streams.

85-D-160	Test Reactor Area (TRA) Security System Upgrade, INEL, Idaho	$ 2,203	$ 2,750

This project will enhance the intrusion and sabotage prevention at the TRA, located at the INEL, and will increase the physical protection of the Advanced Test Reactor (ATR) plant. State-of-the-art detection and intrusion control systems will be utilized, and equipment and methodology resulting from ongoing DOE research programs will be incorporated into the design of four subprojects whose completion will accomplish the goals set forth in the TRA Security Plan.

82-N-103	Waste handling and isolation facilities, Richland, Washington .	$ 2,069	$ 2,000

This project provides capital funds for the isolation of old single-shell tanks and related structures (e.g., sealing of tank openings); surveillance instrumentation for monitoring waste storage tanks; upgrading of the cathodic protection system to protect buried piping against corrosion; improvements in the centralized Computerized Automatic Surveillance System for the waste tanks; and construction of a Transportable Grout Facility to process low-level liquid waste streams for disposal. These streams are currently routed to double-shell tanks for storage.

81-T-105	Defense waste processing facility (DWPF), Savannah River, South Carolina	$ 155,400	$ 135,000

This project will provide a facility for solidifying the high-level radioactive waste at the SRP for temporary storage on site, and for transportation to, and disposal in a

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a/ Assumes $4,200,000 will be provided through reprogramming from Project No. 83-D-157 in FY 1987.

geologic repository. This facility will immobilize the HLW in borosilicate glass in steel canisters. The canisters will be stored on the SRP site in air-cooled vaults until a geologic repository is available. The project will also provide for the solidification of the decontaminated portion of the liquid and salt waste for disposal on site as a low-level radioactive waste (saltstone). Opportunities to recover useful byproducts will be considered and implemented where practical. Operation of the DWPF saltstone facilities will begin in FY 1988 and sludge vitrification will begin in early FY 1990. The DWPF will process the backlog waste inventory over approximately 10-15 years.

Fiscal year 1987 construction activities will focus on completion of major structual facilities, to about 85 percent complete for the total project. Design will continue to about 98 percent complete. Major equipment installation will continue into FY 1988. The FY 1987 funding level is necessary to maintain a project schedule for hot operations in early FY 1990 and to maintain the total estimated cost.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular Dollars in Thousands. Narrative Material in Whole Dollars).

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

3. Date A-E work initiated: 1st Quarter FY 1987

3a. Date physical construction starts: 1st Quarter FY 1987

4. Date construction ends: 4th Quarter FY 1989

5. Previous cost estimate: N/A
Date:

6. Current cost estimate: $26,535
Date: 12/86

7. Financial Schedule (prior year projects shown for comparative purposes):

Fiscal Year	Obligations	COSTS FY 1985	 FY 1986	 FY 1987	 After FY 1987
Prior Years	$ -3	$ 16,223	$ 5,213	$ 0	$ 0
1985	23,645	5,094	7,215	8,215	3,121
1986	23,453	0	14,659	4,937	3,857
sequestered 1986	(996)	0	(436)	(560)	0
1987	26,535	0	0	12,911	13,624

8. Brief Physical Description of Project:

These projects provide various items of new construction, additions, alterations, and improvements to the lands, buildings and utility systems at the Albuquerque, Nevada, Richland, Idaho, Oak Ridge, Savannah River, and Fernald offices to support waste management program needs in health, safety, environment, general support, and other program requirements. Some of the projects may be located on non-government land.

These projects also provide for various items of new construction, additions, and alterations to the land, buildings, and utility systems at Savannah River in support of the Long-Term Waste Management program. This includes the cost of installation which is an integral part of general plant projects.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: [illegible]

6. Purpose, Justification and Need for, and Scope of Project

The estimate is based on the requirements of the various operating offices cited below:

INTERIM WASTE OPERATIONS	
Albuquerque-Los Alamos National Laboratory	[illegible]
Nevada Test Site	[illegible]
Richland	[illegible]
Idaho	[illegible]
Oak Ridge National Laboratory	[illegible]
Savannah River	[illegible]
Feed Materials Production Center (FMPC)	[illegible]
Richland-Landfill	[illegible]
Idaho-Landfill	[illegible]
Subtotal Interim Waste Operations	[illegible]
LONG-TERM WASTE MANAGEMENT TECHNOLOGY	
Savannah River	[illegible]
Total Defense Waste and Byproducts Management	[illegible]

Examples of subprojects under consideration are given below with preliminary cost estimates. A continuing review of requirements may result in changes, additions, or postponements.

ALBUQUERQUE-LOS ALAMOS NATIONAL LABORATORY-INTERIM WASTE OPERATIONS .... [illegible]

[illegible] Transportation Facility [illegible]

This project will provide for direct certification of stored waste, screening of stored combustible waste before incineration and transportation of newly-generated wastes. [illegible] structure of about [illegible] square feet will have a high bay area for temporary waste storage, [illegible]. The building will also include restroom facilities, a small office, [illegible] and electrical equipment rooms. The transportation portions will include a drive through vehicle loading bay, and an additional [illegible] area for WIPP-certified waste containers.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, interim waste operations and long-term management technology, various locations

2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

NEVADA TEST SITE-INTERIM WASTE OPERATIONS.. $ 220

Underground Water Line $ 220

This project will improve the service water (fire, drinking, decontamination and toilets) requirements at Area 5 of the PWMS at the NTS. This project consists of a pumphouse, a 6-inch diameter pipeline 5 miles long and a 50,000 gallon water tank. Water will be distributed from the pumphouse at the storage tank to buildings 5-6 and 5-7. The pipeline will be underground to avoid freezing.

RICHLAND-HANFORD SITE-INTERIM WASTE OPERATIONS .... $ 5,310

Capital Work Orders $ 360

These are miscellaneous projects of a capital nature, which are necessary to maintain continuity of operation, protection of the environment, and to provide safeguards for the protection of life and property. Such jobs would include additions, improvements, replacements of structures, building services, utilities, and associated equipment.

200 East Contingency Pond $ 950

This project will provide a 15 acre seepage pond near the northeast corner of 200 East Area and install a culvert tie into waste water line to 216-A-25.

242-S Evaporator Pond $ 700

This project will provide a new disposal facility for 242-S evaporator effluents.

B-Plant Canyon Crane Mechanical Upgrade $ 900

This project will upgrade the mechanical structure and subsystems of the existing B-Plant Canyon Crane to extend its useful life and enhance its operability and maintainability.

B-Plant Canyon Rail Replacement $ 900

This project will remove and replace the B-Plant canyon bridge crane support rails. This modification will ensure crane mobility for the extended operations planned in B-Plant.

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

AW Farm Exhauster Ammonium Nitrate Removal $ 250

This project will provide upgrades to AW Tank Farm Exhauster to remove ammonium nitrate from the effluents. Currently, ammonium nitrate is forming on the plenum areas downstream of the high-efficiency particulate air (HEPA) filters.

Tank 105-A Exhauster Upgrade $ 500

This upgrade will include installation of existing exhauster on a permanent concrete pad, with permanent power supply and condensate drains. A flushable de-entrainer with replaceable pads will be required for nitrate removal, and with a permanent connection for the temporary use of a portable exhauster during filter changes. Modification to existing tank ventilation lines will also be required.

B-Plant Cooling & Sanitary Water Supply Upgrade $ 750

This project will replace or upgrade elements of the current B-Plant cooling and sanitary water systems to extend their useful lives for the currently projected operating life of the facility.

IDAHO NATIONAL ENGINEERING LABORATORY-INTERIM WASTE OPERATIONS................................ $ 2,650

Service Waste Diversion System Single Failure Upgrade $ 500

Prior to January 1984, the ICPP service waste, which is ICPP's process water not coming into direct contact with radionuclides, went to an injection well. Now the service waste goes to a percolation pond to satisfy State and Federal requirements. In the event of an emergency or failure of the Service Waste System, a diversion system automatically diverts the delivery of the service waste from the percolation pond to the injection well. However, several types of single mode failures in the system can cause a diversion of service waste to the injection well, which is undesirable. This project will install redundant equipment, new instrumentation, etc., that are necessary to eliminate all the probable single failures causing unintended use of the injection well.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

Major Equipment Decon Facility $ 400

This project provides for decontamination of major items of equipment such as trucks, earth moving equipment, etc., that become radioactively contaminated during earth moving activities inside the ICPP. There presently are no facilities at ICPP to handle decontamination of such large equipment. Decontaminating equipment outdoors and allowing decontamination solutions to enter the environment is an unacceptable practice. This project will provide a facility to safely handle the decontamination of this large equipment.

Upgrade Spectrochemistry Laboratories $ 600

The spectrochemistry labs are presently located on the main and second floors of the Analytical Laboratory Building. All of the heating and ventilating equipment is located on the second floor of the building. Vibrations from the operating equipment are transmitted through the building's structure and seriously affect the precision and accuracy of the laboratory instruments. Also, the labs are lacking a good controlled atmosphere resulting in contaminated samples due to chemicals and dust in the air. To alleviate many problems, these labs will be located in the basement of the Analytical Laboratory Building. The floor is quite stable and offers adequate floor space. Ventilation equipment will be installed as required.

The benefits of this project will be an increase in sample throughput, improvement in precision and accuracy, and reduction in external contaminants.

Toxic Waste Holdup System for Pilot Plants $ 600

Chemical wastes containing hazardous materials are currently mixed with radioactive wastes and then processed through the existing ICPP process equipment waste system or sent directly to the existing high-level liquid waste tanks. This present practice does not conform to the National Waste Management Act of 1982 and other DOE directives which require that the mixing of radiological and non-radiological wastes be minimized.

To alleviate this situation, tankage and piping shall be provided to create a separate non-radiological storage system capable of handling hazardous liquid wastes. These wastes shall then be disposed of at approved storage locations.

Miscellaneous Minor GPP-ICPP $ 240

Each year small, miscellaneous, but very important, minor GPP's are identified during the middle of the fiscal year. These are projects which require immediate attention. With all of the GPP funds previously committed, there are not funds remaining for such projects. This project will make funds available for implementing these small GPP's. The funding limit

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

for each project is $25,000. Individual descriptions for these projects will be written as they are identified. Typical examples of minor GPP's are evacuation alarms, fire alarms, process cell hatches, ceiling replacements, waste line installations, and small storage facilities.

Stored Waste Examination Pilot Plant (SWEPP) Paint Room Upgrade $ 100

The outside surfaces of waste containers to be examined in SWEPP were originally thought to be in good physical condition, requiring only touch-up painting before shipment to the Waste Isolation Pilot Plant (WIPP). However, based on the physical condition of the drums retrieved to date, it is apparent that a large number of the storage waste drums will require complete repainting. This project upgrades the existing painting room of the SWEPP building from a "brush-only" to general spray painting capability.

Paved Accesses to SWEPP and TSA (Transuranic Storage Area) Pads $ 60

Presently, the only paved access to the SWEPP building is via the north airlock; no paved access is available to the sides of TSA storage pads. Paving is needed in these areas to facilitate the movement, particularly in wet soil conditions, of semi-trucks/trailers and other heavy vehicles involved in waste retrieval and transportation. This project provides the required accesses.

Certified and Sorted (C&S) Building North Airlock $ 150

The planned C&S Building North Airlock consists of an access tunnel, two electric motor operated overhead doors, and other appurtenances large enough to accommodate a tractor-trailer with a Transuranic Waste Storage Container (TRUPACT) on the trailer. The north airlock will be primarily used for loading TRUPACTS for shipment to the WIPP or the Process Experimental Pilot Plant (PREPP). It is estimated that at least 100 TRUPACTS will be processed each year.

OAK RIDGE NATIONAL LABORATORY-INTERIM WASTE OPERATIONS.. $ 3,150

LLW Line Replacement, Building 3038 $ 950

The purpose of this project is to provide several hundred feet of double-contained stainless steel piping, a valve pit, valves, and monitoring system in order to restore LLW service to Building 3038, which is used for isotope production. The new waste line will transport liquid LLW from Building 3038 to tank WC-10, and will replace piping which was abandoned because it leaked.

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

Rinse Recycle, PWTP $ 950

This project consists of collection tanks, piping, valves, and pumps for collecting and recycling the rinse water for volume reduction prior to evaporation and disposal in the LLW System. Significant amounts of nitrates in excess of State regulations are released into White Oak Creek from the Process Waste Treatment Plant (PWTP) operations. Disposal of the rinse water in the LLW system will bring the PWTP into compliance with the NPDES permit for nitrates.

Waste Transfer Line Replacement, Melton Valley $ 800

This project will provide for installation of approximately 6,300 feet of replacement PVC pipe to transfer process waste from Melton Valley to the PWTP in Bethel Valley. The existing transfer piping is approaching its design life and has required repairs because a portion was leaking. The replacement piping will provide an upgraded transfer system for liquid LLW which requires treatment to remove small amounts of radioactivity.

Monitoring Wells, Bethel Valley $ 450

This project provides for the installation of several permanent groundwater sampling wells in Bethel Valley to meet RCRA requirements. The system of wells will measure hydrostatic head, groundwater quality, and migration of contamination. The data will be used to develop a data base on contaminated groundwater plumes to support planning for remedial actions and insure compliance with regulations.

SAVANNAH RIVER PLANT-INTERIM WASTE OPERATIONS .... $ 2,760

Minor Projects $ 670

Minor projects, each costing $75,000 or less, are needed to (1) maintain safety and continuity of operations and (2) add to existing programs in support of the Interim Waste Management Program.

TRU Waste Storage Pads, 643-G $ 800

This provides six additional TRU waste storage pads in the 643-G burial ground. The existing pads will be filled in 1987 and additional storage space is needed for the waste. A lack of approved storage space for TRU waste would affect the operation of the 200-Area B-Lines.

1. Title and location of project: General plan projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

F Diversion Box 1 Retirement Cover, 241-F $ 200

Diversion Box No. 1 in F Area is being prepared for retirement in the near future. The use of a permanent cover upon retirement would eliminate rainwater in leakage and the need for time consuming caulking and sealing of the cell covers.

Contaminated Canyon Equipment Storage Pads, 643-G $ 390

Provides engineered storage pads for contaminated canyon equipment. Such pads currently do not exist but are needed to prevent contaminated rainwater runoff from the storage boxes.

Improved Tank Farm Containment, Phase II, 241-F $ 700

This provides containment huts and radiation monitors at waste tank risers and other process locations not supplied by FY 1984 projects. This provides required flexibility in designating salt concentrate receipt tanks and in transferring waste between tanks. These huts and monitors assure that all active tank risers and other process locations are equipped for containment and detection of radioactive spills.

FEED MATERIALS PRODUCTION CENTER (FMPC)-INTERIM WASTE OPERATIONS.............................. $ 1,490

Improved Waste Segregtion $ 165

Waste segregation facilities throughout the plant require miscellaneous upgrading efforts in order to assure stringent management of contaminated waste. The segregation facilities are required in order to minimize the volume of low-level waste requiring disposal.

Graphite Burner $ 250

A new facility is required to provide for volume reduction of scrap graphite, including spent crucibles. The new graphite burner will be installed in an existing FMPC building. The present incinerator will not meet EPA emission standards and must be taken out of service. There is no viable alternative to the new incinerator, since pit storage of waste has been terminated.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plan projects, interim waste operations and long-term waste management technology, various locations	2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

Additional Decontamination Capacity $ 300

Upgraded facilities for the decontamination of equipment and scrap are required to reduce the volume of contaminated waste and to make additional costly pad space available for equipment and scrap resulting from demolition and removal of old process facilities as part of the ongoing Site Productivity Retention program. Such equipment and scrap contributed to ground and liquid effluent contamination and should be promptly decontaminated.

Controlled Storage Facility $ 200

A new facility is required for interim storage of bulk quantities of contaminated construction rubble prior to disposal. Rubble is generated as a low-level waste during demolition activities associated with the Site Productivity Retention Program.

The new facility will be seepage resistant and will be strictly controlled in order to meet EPA standards for liquid effluents. Without proper liquid effluent control, soil and ground water contamination will occur. The new facility will be used to store the contaminated rubble pending processing in the Low-Level Waste Processing and Shipping System.

Treatment Facility for Barium Chloride Waste Salts $ 75

A facility is required for treatment (passivation) of contaminated salt sludge waste containing barium chloride, a hazardous substance, prior to disposal as low-level waste. The facility will remove the hazardous component and render the waste suitable for disposal as low-level radioactive waste.

Waste Pit Environmental Upgrading $ 500

Retired waste pits, previously used for storage of contaminated materials, are capped with an earthen cover. The existing covers will be upgraded by adding more soil and providing an internal drainage system in order to minimize ground water recharge into the pits, and hence minimize the potential for release of contamination from the pits.

RICHLAND LANDLORD-HANFORD SITE-INTERIM WASTE OPERATIONS.. $ 3,690

Capital Work Orders $ 280

These are miscellaneous projects of a capital nature, which are necessary to maintain continuity of operations, protection of the environment, and to provide safeguards for the protection of life and property. Such jobs include additions, improvements, and replacements of structures building services, utilities, and associated equipment.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

Route 4S Road Improvement	$ 900

This project will upgrade 2.32 miles of Route 4S from approximately 1/2 mile southeast of the bottom of the 200 East Hill to just past the AP Tank Farm at 200 East Areas. This is part of the upgrading of Route 4S to meet Washington State Department of Transportation standards.

700 Area Alarm System	$ 400

This project will install alarms in the 712 building of the type now in other Hanford locations. Classified documents need additional security precautions, and the project will upgrade the system to the level of protection given to the rest of the site.

Existing alarm systems in the Federal Building would also be replaced to be compatible with the site alarm system.

Classified Waste Destruction Facility	$ 350

This facility will handle the destruction of classified documents for the Hanford area. The new facility will accommodate temporary storage of these documents and will house new larger machinery. The new machinery will provide safer more efficient destruction of classified items. The facility will provide a ventilation system that is compatible with current safety recommendations for respirable dust which is not provided in the existing facility. More destruction capacity is provided to meet future demands as well.

Office Building	$ 950

This project provides a 15,000 square foot office facility in the 200 East Area. Construction will be wood frame over a slab on grade. This facility will provide office space for 90 to 100 people. Space for a lunchroom, restrooms, office equipment, storage and conference rooms will be provided. The additional office space is required to adequately staff and manage the current work load. Many personnel are currently in temporary office facilities that are to be replaced by this facility.

Additional Water Pump, 182-D	$ 400

This project will provide a 6,000 gpm operational spare pump at the 100-D Area pumping station. Piping, valves, pump, electric motor and motor starter are required. This will augment the 100-D Area pumping capacity to 30,000 gpm to provide enhanced reliability to the entire site.

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

Electrical Metering - 300 Area $ 410

This project will provide electrical metering on individual building services in the 300 Area by installing instrument transformers and pulse generating watt-hour demand meters. This project will provide better data on power usage for billing, power management, and conservation programs.

IDAHO NATIONAL ENGINEERING LABORATORY-LANDLORD-INTERIM WASTE OPERATIONS...................... $ 5,560

Miscellaneous and Minor Projects $ 60

These are small subprojects lumped together under one GPP to address smaller emergency or high-priority needs and for ease of administration of projects with lower costs. These projects are sometimes not identified until several weeks before they are constructed. Examples of such projects are drainage corrections, personnel survey station modifications, crane rail modifications for safety, security-related improvements, head bolt heater rack upgrades, culvert replacements, etc.

INEL 1987 Road Program $ 500

This project consists of modification, upgrade or renovation of miscellaneous small and high priority paving projects at various INEL locations. This would include intersection changes, service road upgrades, minor parking lot expansions or other priority projects needed for safety, uninterrupted transport of radioactive materials, security patrols and emergency response, and for other operations traffic. Projects currently identified as candidates for inclusion in this project include parking lot expansions to maintain safe, clear access to facilities, service road paving for use by fuel delivery trucks, intersection modifications, and turnouts for safety reasons.

INEL Safeguards and Security Improvements $ 950

This project will provide safeguards and security improvements at the INEL. This project will include redundant safeguards and security alarms at various INEL locations, road safety improvements at guard station locations, and improved perimeter lighting at various security facilities.

CFA Office Building No. 3 $ 850

This project will complete the long-range plan to consolidate office functions in a centralized location. This new office building (approximately 8,500 square feet) will house personnel currently located in scattered outlying bungalows which are

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

old and both energy- and space-inefficient. Also, the office building will provide space for Idaho Falls personnel to be relocated to the site.

CFA Safety Calibration Laboratory $ 370

This project will replace the existing calibration laboratory and provide expanded calibration capabilities at the INEL. The new facility will be capable of handling new and existing programs and support functions. Health and safety deficiencies exist in the present facility due to the deterioration of the building, the inadequacy of electrical systems in meeting code requirements, and the inability to control the environment for testing purposes. The new facility will correct all health and safety deficiencies that currently exist and will allow those testing and calibration functions to be performed which are currently impossible due to the absence of an adequate facility.

CFA Lead Pouring Facility $ 460

This project will replace the current lead pouring facility with an approximate 2,500 square foot building which will house a setup area, storage area, and lead melting area. The current lead pouring facility is 31 years old, has insufficient ventilation (no longer meet OSHA requirements for the removal of lead fumes, etc.), has no permanent heating system, and is housed in an uninsulated metal building. The existing equipment is antiquated and in poor working condition. This project will continue to expand the INEL capability to make lead pours in a safe and efficient manner.

TRA MCC/Swithgear Upgrade $ 200

Obsolete Motor Control Centers (MCC's) and switchgear will be replaced by this upgrade. Many of these units cannot be maintained due to the unavailability of parts. In addition, the current system cannot accommodate new electrical power requirements. This project will properly allocate electrical loads to support needed programs and future expansion.

TRA Hot Cells Heating and Ventilation Upgrade $ 110

This project will upgrade the H&V system in the TRA Hot Cells. Presently, there is an imbalance of air pressures resulting in air movement from contaminated to noncontaminated areas. The existing air intake ducts frost over, restricting the flow to the point where the heating system shuts down, and exaggerating the loss of differential pressure zone control in the building.

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

TRA Hot Cells Utilities Upgrade	$ 110

This project will upgrade the electrical services outlets in the cell and in the cell-face utility raceways. In-cell plant air, water, vacuum, and inert gas piping and outlets will also be installed. Ground fault interruption protection devices will be installed in selected areas. The existing electrical service is not in accordance with current electrical codes, is partially inoperative, and is insufficient for present needs.

TRA Hot Cells Viewing Window Upgrade	$ 100

This project will upgrade the existing shield window liquid expansion and maintenance support systems and equipment at the TRA Hot Cells. The window zinc bromide expansion tank system, the window oil expansion tank system, and an oil zinc bromide inert gas purge/blanket system will be upgraded. The upgraded window maintenance systems will allow a systematic individual maintenance program to control window deterioration and maintain good viewing characteristics.

TAN Hot Shop Dispatcher Control Console Upgrade	$ 950

This project will relocate all facility control, monitoring, and alarm systems to the TAN Hot Shop dispatcher control console located in the south operating gallery. This will provide a central control console to facilitate facility status checks and control. This project also includes providing duplicate alarms at a continuously manned location.

TAN/WRRTF Motor Control Centers (MCC) No. 5 and No. 6	$ 150

This project will install a 480 V 60 Hz, 3 phase, 4 wire, totally enclosed, dead front, free standing assembly. The motor control center will contain motor circuit breakers and starters. The existing MCC's are becoming increasingly difficult to maintain due to their age and the unavailability of replacement parts. Numerous National Electrical Code (NEC) deficiencies exist which present hazards to maintenance and operating personnel. This project will correct code deficiencies and reduce the possibility of programmatic impacts from the loss of critical circuits due to breakdowns.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

9. Purpose, Justification of Need for, and Scope of Project: (continued)

TAN Guardhouse and Office Renovation $ 750

This project provides for the renovation of office and guardhouse areas in the TAN guardhouse and office building. This complex was constructed in 1954. Over the past 30 years, various modifications to the office area have left a multitude of different configurations. Office areas are below standard for a productive work environment. The guardhouse area and entrance is poorly laid out and is substandard to other area guardhouses. Renovation will involve minor interior rearrangement, painting, wall covering, and flooring. This project will provide office space for existing personnel and personnel growth projected for the TAN area.

SAVANNAH RIVER - LONG-TERM TECHNOLOGY.. $ 735

Support Facilities, TNX $ 400

This will provide for additional or modified facilities and services at the TNX area associated with DWPF process demonstration and startup. This includes additional electrical capacity, a control room and laboratory facilities to support the Integrated Melter System and the 1/5 scale precipitate Hydrolysis demonstration equipment.

Support Facilities for Operating Personnel, S-Area $ 335

This will provide new facilities, repairs, and maintenance projects related to operations in S-Area. Included is a pre-engineered building for shop space for Savannah River Plant personnel assigned to the maintenance of completed S-Area facilities (i.e., water system, sewage treatment, opeations building, etc.). Also included are miscellaneous small repair and maintenance projects for operations related facilities in S-Area.

10. Details of Cost Estimate:

It is not possible to provide a detailed cost estimate for the projects. Cost estimates for general plant projects are normally included in the request for a construction directive after the need for the work has been established, the scope of the job determined, and the preliminary engineering completed.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, interim waste operations and long-term waste management technology, various locations

2. Project No.: 87-D-171

11. Method of Performance:

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be by fixed-price contracts and by subcontracts awarded competitively.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

Not applicable to projects with a total estimated cost of less than $5 million each.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not applicable to projects with a total estimated cost of less than $5 million each.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: WESF K-3 filter system upgrade, Richland, Washington

2. Project No.: 87-D-172

3. Date A/E work initiated: 2nd Quarter FY 1987

3a. Date physical construction starts: 2nd Quarter FY 1988

4. Date construction ends: 1st Quarter FY 1989

5. Previous cost estimate: None

6. Current cost estimate: $3,300
Less amount for PE&D: 0
Net cost estimate: $3,300
Date: 3/85

7. Financial Schedule:

Fiscal Year	Authorization	Appropriation	Obligation	Costs
1987	$ 500	$ 500	$ 500	$ 400
1988	2,800	2,800	2,800	2,320
1989	0	0	0	580

8. Brief Physical Description of Project:

This project will provide a new exhaust filter system for the Waste Encapsulation and Storage Facility (WESF). The new filter assemblies will incorporate several features to increase system reliability and environmental safety. Mechanisms will be installed to seal the filter assembly thereby isolating the contamination on the HEPA filters from the environment. As presently conceptualized, prefilter and liquid removal capability will be provided through a system of impingement vanes, de-entrainer pads with on-line flushing capabilities, heaters, and a built-in sump. An in-place test system will be installed to permit individual filter stage leak testing.

The new filter assemblies will be designed to replace the current filters, to provide containment during changeout activities, and to permit the K-3 ducts to be flushed to remove radioactive material deposited in the duct without excessively contaminating or breaching the high efficiency particulate air (HEPA) filter assembly. The filter assemblies are presently planned to utilize the existing filter pit and inlet and outlet connectors to retain the general configuration of the original filters.

The filters shall be designed for remote installation and removal using a conventional boom crane for lifting the filter and manipulating an electric impact wrench.

1. Title and location of project: WESF K-3 filter system upgrade, Richland, Washington
2. Project No.: 87-D-172

8. Brief Physical Description of Project: (continued)

Existing utilities will be routed to the filter pit to support the new filter assembly. Demineralized water will be required for the de-entrainer and heater flushing systems, electrical service will be required for the heaters, and steam will be required for the sump jet, instrumentation, sampling, and injection lines. A new waste line will be installed from the filter pits to a waste catch tank.

The exhaust system fans and motors will be upgraded to compensate for the increased differential pressure across the filter due to the addition of de-entrainment equipment.

The FY 1987 appropriation will be utilized for accomplishment of definitive design.

9. Purpose, Justification of Need for, and Scope of Project:

All future operating and surveillance activities at WESF will require a filter system to maintain contamination control in the facility hot cells and canyon areas. The new filter system is needed to reduce the potential for contamination spread to the environs by providing improved containment. The K-3 exhaust ventilation system at the WESF provides filtered ventilation for the facility's processing cells and canyon area. The duct system preceding the HEPA filters has been determined to contain an estimated four to 19 filter loads buildup of contamination, using an amount of cesium and/or strontium equivalent to 40 R/hr to define a load. The current filter system is incapable of handling a large radionuclide loading should some part or all the contamination move to the filter enclosure. When or with what frequency the contamination will migrate towards the HEPA filters, what portion will migrate, why it will move, or how to stop it are all unknowns. The frequent need to replace filter enclosures and the high radionuclide level on the spent filters have highlighted another problem. When the expended filter is lifted from the containment pit the filter internals are exposed to the environs. The potential of spreading contamination to the environment exists. A filter assembly is needed which provides containment during changeout activities and is capable of handling a large surge of radioactive particulate as would occur in a cleaning operation.

If this project is not supported, the transfers of existing contamination in the duct system to the filters could bring plant operations to a halt pending filter changeout. The high radiation exposure and contamination spread potential would necessitate special methods, not currently available at the Hanford site, to be used. A recovery technique has been postulated that would take nearly 14 months and is estimated to cost $3,100,000 to $4,000,000.

10. Details of Cost Estimate: a/

	Item Costs	Total Costs
a. Engineering, design, and inspection at approximately 27% of construction costs, item b..		$ 600

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: WESF K-3 filter system upgrade, Richland, Washington

2. Project No. 87-D-172

10. Details of Cost Estimate: a/ (continued)

	Item Costs	Total Costs
b. Construction costs		2,200
(1) Special facilities - filters, sumps, heaters, leak detectors, impingement vanes	$ 2,200	
c. Standard equipment		0
Subtotal		$ 2,800
d. Contingency at approximately 18% of above costs (items a, b)		500
Total estimated cost		$ 3,300

a/The estimate is based on conceptual design effort that is 100% complete.

11. Method of Performance:

Design will be performed by the onsite architect-engineer contractor. Construction and procurement will be done by the onsite construction contractor. The installation of filter assemblies and procurement of jumper parts and HEPA filters shall be performed by the operating contractor.

Funding Schedule of Project Funding and Other Related Funding Requirements:

Not applicable to projects with a TEC of less than $5 million.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not applicable to projects with a TEC of less than $5 million.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: 242-A evaporator crystallizer upgrade, Richland, Washington

2. Project No.: 87-D-173

3. Date A/E work initiated: 2nd Quarter FY 1987

3a. Date physical construction starts: 4th Quarter FY 1987

4. Date construction ends: 1st Quarter FY 1991

5. Previous cost estimate: None

6. Current cost estimate: $12,600
Less amount for PE&D 0
Net cost estimate: $12,600
Date: 3/85

7. Financial Schedule:

Fiscal Year	Authorization	Appropriation	Obligation	Costs
1987	$ 2,800	$ 2,800	$ 2,800	$ 1,800
1988	7,200	7,200	7,200	7,600
1989	1,900	1,900	1,900	1,000
1990	700	700	700	1,900
1991	0	0	0	300

8. Brief Physical Description of Project:

This project will upgrade the existing Evaporator Crystallizer (E/C) to extend its life through the year 2000. The project will upgrade equipment and systems which have a history of maintenance problems, are not expected to withstand operation through the year 2000, or need corrective measures to meet existing standards. This upgrade will include implementation of system changes which will improve the overall system operating efficiency.

Examples of modifications/upgrades which will be required are as follows:

- o Decontamination facility: An East area decontamination facility will be added onto the E/C. This facility will primarily support E/C operations since space for maintenance and decontamination is not available in the E/C. The decontamination facility will have an approximate overall dimensional floor plan of 57 by 32 feet with an approximate total square footage of 2,150 square feet. The building will be approximately three stories high (46 feet). Rooms in the decontamination facility will consist of the following: a viewing corridor, a chemical make-up room, pump storage areas, decontamination and maintenance areas, airlocks, and an extension of the existing crane maintenance platform. The decontamination facility will have its own heating, ventilating, and air conditioning (HVAC) system, with an

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	242-A evaporator crystallizer upgrade, Richland, Washington	2. Project No.: 87-D-173

8. Brief Physical Description of Project: (continued)

approximate flowrate of 6,500 cfm. The decontamination facility will be interlocked with the upgraded HVAC that will be installed as part of this project. Fire protection will be provided throughout all areas, and safety showers will be installed in the chemical make-up room.

o Electrical power: A new emergency power generator shall be provided for the evaporator. This generator shall have 24-hour maintenance-free capabilities and be sized to supply electrical power to existing systems and additional systems installed by this project. No building will be required to house this generator. A new 1500KVA substation will be added to meet current and future electrical demands.

o Lighting: The existing process area lighting system will be replaced with an improved, waterproof, energy efficient and lower maintenance lighting system.

o Insulation: The vapor/liquid separator will be insulated to improve capabilities by sending more concentrated slurries to the tank farms. This insulation will allow the process temperature to go to a maximum of 200°F.

o Condensers: A new primary condenser with design features to reduce corrosion will be installed. This condenser will have appropriate instrumentation and controls installed to monitor the cooling water and process vapor. This instrumentation and control will be tied into the new monitor and control system (MCS). The intermediate and after-condensers will be replaced with a mechanical vacuum pump system compatible with the new process control system.

o Pumps: The recirculation pump shall be upgraded to increase temperature/amperage limits, and have vibration and acoustic analysis equipment installed. The slurry out system shall be upgraded to allow enhanced pumping of double shell slurry (DSS) to the AP Tank Farm. This will be achieved with an upgrade to the slurry out pump and the installation of a booster pump station. The booster pump station will be an approximately 16 by 16 feet minature vault with an approximate area of 250 square feet. The station will have pumps, jumpers, an HVAC system with an approximate flow rate of 1,000 cfm, and other equipment necessary to assist the transport of concentrated slurry from the E/C to the 241-AP Tank Farm. The station will be approximately 14 feet below grade. The booster station will receive and transfer waste via the existing supernate and slurry lines going from the 241-AW Tank Farm to the 241-AP Tank Farm. Piping will be insulated, have cathodic protection, and other design features to be compatible with those of the 241-AP Tank Farm. Other existing pumps will be replaced/upgraded as necessary to meet the extended life of the E/C and the new process criteria.

o Heating, ventilation, and air conditioning: The existing HVAC system will be provided with a new control system as part of the new MCS. The HVAC MCS shall be interfaced with the process MCS only to the extent of providing input to the monitors. Modifications in HVAC zones will be made to meet the requirements of ERDA 76-21, "Nuclear Air Cleaning Handbook" (rezoning areas, installing backflow preventors, installing equipment to implement the rezoning requirements, etc.).

1. Title and location of project: 242-A evaporator crystallizer upgrade, Richland, Washington   2. Project No.: 87-D-173

8. Brief Physical Description of Project: (continued)

- o Service crane: Upgrades in the service crane will include the installation of a remote television monitor camera, a second auxiliary hook, a general upgrade to insure crane support through the extended life of the evaporator, and expanding its coverage area to include the decontamination facility.
- o Communication system: A new communications system will be installed to increase personnel operating efficiency. The new communications system will allow personnel to communicate between zones.
- o Bottom valves: The bottom dump valves will be upgraded. The new valves will reduce maintenance and eliminate the difficulty of obtaining parts.
- o Sampling system drain: A drain will be added to the slurry sampler to allow draining of the sampler's jumper. This will reduce operational constraints due to having liquid trapped in the jumper.

A new MCS will be included to improve system operating efficiency and provide operators with the ability to monitor and record data to improve the quality control of slurry outputs, thereby reducing waste volume. Various systems (reboiler, de-superheater, etc.) will have instrumentation and controls upgraded to be compatible with the new MCS.

Many of the project upgrades to the evaporator system and equipment will have to be performed in radioactively contaminated zones. These work conditions will add significantly to project construction costs.

The FY 1987 appropriation will be utilized for accomplishment of definitive design, initiation of advance procurement and award of the Phase I fixed price construction contract. Construction will occur in two phases due to the need for the evaporator to be operational. The majority of project construction will be accomplished during scheduled operational shutdowns. These shutdown periods of 9 months and 5 months will occur within a 3-year time period.

9. Purpose, Justification of Need for, and Scope of Project:

Currently, the E/C is the cornerstone of waste management operations at the Hanford Site. Because future processing scenarios are not finalized at this time, the E/C must be upgraded to continue to be the major contributor to waste management operations. To date, the E/C has reduced waste volumes by approximately 33.5 million gallons. Serving in a primary role, the E/C will be required to reduce waste volumes an additional 33 to 58 million gallons. This would eliminate the need to build 33 to 58 non-aging waste tanks. Signs of wear from extensive operations, increased future processing demands, and extended operating life indicate that continued operation would be difficult without major downtime for repairs. Future operation and efficiency is projected to decrease even more as the E/C reaches its 10-year design life in 1987. In addition, upgrades will be required to meet existing standards. In order to avoid increased downtime and potential negative impact on Waste Management operations, an upgrade of the facility is required. The upgrade will repair

9. Purpose, Justification of Need for, and Scope of Project: (continued)

and reduce system wear, increase operating efficiency ($4,000,000 current annual operating costs), and extend the operational life of the E/C through the year 2000. The increased capabilities of the E/C will allow waste management operations to meet projected demands within anticipated funding limits.

The upgrades will be centered around three areas: 1) increase the E/C's operating efficiency; 2) bring the E/C into compliance with existing standards: 3) double the operational life of the E/C by extending the operational life through at least the year 2000.

The area 1 upgrades will improve operating efficiency by increasing the E/C's capabilities to produce a concentrated slurry and by reducing operational downtimes. The increased capabilities to produce more concentrated slurries will allow transport of slurries with viscosities approximately 62 percent greater than current limitations. This will in turn allow increases in waste volume reduction above current limits of approximately 25 percent. The increased capability items include adding a new process control system for better monitoring and control of the processes and upgrading the slurry transport system by upgrading the slurry out pump, installing a booster pump station, and insulating the vapor/liquid separator. The upgrades will also increase the recirculation pump capabilities to reduce operational impacts due to fouling, upgrade various control variables (instrumentation, vacuum generators, etc.) to be consistent with the new control system, and add a decontamination facility to the E/C.

Operational downtimes will be reduced by the decontamination facility, which will primarily support E/C operations, but will also be used to support 200 East area tank farm operation. This support for the E/C and the tank farms will be to avoid constraints resulting from meeting as low as reasonably achievable (ALARA) and Department of Energy (DOE) requirements for repair and transportation of radioactive equipment (DOE Order 5480.1A, Chapter III, "Safety Requirements for the Packaging of Fissile and Other Radioactive Materials.")

Current area 2 upgrades will consist of upgrading the building HVAC to meet recommendations of the Energy Research and Development Administration (ERDA) 76-21, "Nuclear Air Cleaning Handbook."

Area 3 upgrades include replacing existing pumps, valves, and lighting fixtures, and upgrading the service crane. This will reduce repair constraints as existing equipment and parts are becoming obsolete, and repair kits and parts are difficult and will become impossible to obtain.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: 242-A evaporator crystallizer upgrade, Richland, Washington

2. Project No.: 87-D-173

10. Details of Cost Estimate: a/

	Item Cost	Total Costs
a. Engineering, design and inspection at approximately 22% of construction costs (items b-e)...........................		$ 1,900
b. Construction costs...		7,400
(1) Buildings - expansion of evaporator for decontamination and storage facility (2,150 ft @ $470/sq. ft)...................................	$ 1,020 b/	
(2) Utilities - substation installation.........................	280	
(3) Special facilities - process piping insulation, condensors, pumps, HVAC and service crane modifications...	6,100	
c. Standard equipment...		0
d. Major computer items; computertized process monitor and control system...		1,200
e. Removal less salvage...		0
Subtotal....................................		$ 10,500
f. Contingency at approximately 20% of above costs................		2,100
Total project cost..........................		$ 12,600

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a/ Cost estimates are based on complete conceptual design and include extensive work in high radiation zones.

b/ High unit cost due to: (1) a seismic category I concrete addition to a radioactively contaminated structure; and (2) this building will be a 46 feet high multi-bay type structure.

11. Method of Performance:

Design and inspection will be performed by the onsite architect-engineer contractor. Construction and procurement will be performed by the onsite construction contractor for contaminated work, with the balance by an offsite contractor on a fixed price contract. Procurement of engineered and long-lead equipment, installation of pumps and jumpers, tie in of "hot" utilities and burial of contaminated equipment shall be performed by the operating contractor.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: 242-A evaporator crystallizer upgrade, Richland, Washington

2. Project No.: 87-D-173

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	TOTAL
a. Total project costs							
1. Total facility costs							
a. Construction line item....	$ 0	$1,800	$ 7,600	$ 1,000	$ 1,900	$ 300	$12,600
b. PE&D......................	0	0	0	0	0	0	0
c. Inventories...............	0	0	175	25	0	0	200
Total direct costs........	$ 0	$1,800	$ 7,775	$ 1,025	$ 1,900	$ 300	$12,800
2. Other project costs							
a. R&D necessary to complete construction.......	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
b. Conceptual design costs.......................	448	0	0	0	0	0	448
c. Other project related costs.......................	$ 80	$ 200	$ 220	$ 150	$ 250	$ 75	$ 975
Total other project costs.......................	$ 528	$ 200	$ 220	$ 150	$ 250	$ 75	$ 1,423
Total project costs.......	$ 528	$2,000	$ 7,995	$ 1,175	$ 2,150	$ 375	$14,223

b. Other related annual costs (estimated life of project: 11 years)	
1. Facility operating costs..	$ 4,000
2. Programmatic operating expenses directly related to the facility...........................	0
3. Capital equipment not related to construction but related to programmatic effort in the facility..	100
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility..	450
Total related annual costs..	$ 4,550

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project funding
  (1) Total facility
    (a) Inventories - inventories necessary to put the facility into use.

1. Title and location of project: 242-A evaporator crystallizer upgrade, Richland, Washington — 2. Project No.: 87-D-173

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements: (continued)

(2) Other project costs
  (a) R&D necessary to complete construction - none.
  (b) Conceptual design - funding necessary to complete conceptual design.
  (c) Other project related costs - decontamination, project management and support.

b. Total related funding requirements - facility is estimated to be used 25 years for its programmatic purpose.
  (1) Facility operating costs - current operating costs of the facility is $4,000,000/yr. No change will occur due to the upgrades provided.
  (2) Programmatic operating expenses related directly to the facility - This project supports the overall waste reduction mission at Hanford.
  (3) Capital equipment not related to construction but related to programmatic efforts in the facility - $100,000 based on operating history to date.
  (4) Maintenance, repair, GPP or other construction related to programmatic effort in the facility - $450,000 estimated cost is based on experience to date less forecasted savings associated with the upgraded systems.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: 241-AQ tank farm, Richland, Washington
2. Project No.: 87-D-174
3. Date A/E work initiated: 1st Quarter FY 1987
3a. Date physical construction starts: 1st Quarter FY 1988
4. Date construction ends: 3rd Quarter FY 1992
5. Previous cost estimate: None
6. Current cost estimate: $58,000
Less amount for PE&D: 0
Net cost estimate: $58,000
Date: 3/85
7. Financial Schedule:

Fiscal Year	Authorization	Appropriation	Obligation	Costs
1987	$ 3,300*	$ 3,300*	$ 3,300*	$ 2,800
1988	24,800	24,800	24,800	7,800
1989	25,400	25,400	25,400	14,300
1990	4,500	4,500	4,500	15,700
1991	0	0	0	12,800
1992	0	0	0	4,600

Brief Physical Description of Project:

This project will provide four additional underground double-shell tanks for storage of high-heat radioactive liquid aging waste, convert one existing double-shell waste storage tank to handle high-heat waste, encased piping to existing waste transfer facilities, instrumentation and auxiliary equipment for monitoring the waste, improvements to land, additional support and auxiliary facilities, and improvements for controlling radioactive waste to minimize the potential for release to the environment.

The proposed construction site for the four additional tanks is west of the existing aging waste tank farms. This 15-acre parcel will be improved to include access roads, security fencing, and area lighting. Existing facilities, including waterlines, electrical power lines, process lines, and signal cables will be rerouted or removed by this project. The existing waste storage tank to be converted to handle high-heat waste is one of seven tanks located in the 241-AN Tank Farm. Construction utilities, including power and water, will be provided by the project.

*Actual FY 1987 BA request is $2,100,000. Assumes $1,200,000 will be provided through reprogramming from prior year projects, i.e., Project No. 82-N-104, $67,000; Project No. 82-N-107, $550,000, and Project No. 83-D-157, $583,000.

1. Title and location of project: 241-AQ tank farm, Richland, Washington

2. Project No.: 87-D-174

8. Brief Physical Description of Project: (continued)

Eight new buildings will be constructed by this project; seven for the new tank farm and one for the conversion of the existing tank. These include: 1) a prefabricated metal instrumentation building (approximately 650 square feet); 2) a reinforced concrete standby generator/compressor building (approximately 1,400 square feet); 3) a reinforced concrete ventilation facility (approximately 7,000 square feet, including the various pits); 4) a prefabricated metal service enclosure (approximately 150 square feet); 5) a prefabricated metal water treatment building (approximately 1,030 square feet); 6) prefabricated metal sampling facility (approximately 400 square feet); and 7) a reinforced concrete airlift circulator control building (approximately 625 square feet); and 8) a prefabricated metal compressor building (approximately 200 square feet). The prefabricated metal buildings will be designed to meet the requirements of the Uniform Building Code, while the reinforced concrete building will be designed to resist a Design Basis Accident.

Other structures to be constructed as a part of this project include: 1) two cooling towers as part of the heat removal system, and 2) approximately 2,000 feet of piping for transferring waste to and/or from PUREX, B-Plant, and other tank farm related facilities; and 3) approximately 1,100 feet of piping for transferring waste to the converted tank.

Utility service will be extended to the project site for use in the tank farm operation. Electrical power, standby electrical power (diesel generators), raw water, process air, instrument air, and steam will be utilized in normal operation of the tank farm and converted tank.

The additional tanks will be designed similar to the existing one-million gallon double-shell tanks, which consist of a free standing, stress-relieved carbon steel tank within a carbon steel lined, reinforced concrete structure, but with the added capability to accommodate aging waste. The tanks will be equipped with pumps, pump pits, slurry distributors, waste retrieval pits, waste agitation and cooling systems, integral leak detection, radiation, temperature, pressure, liquid level and sludge level instrumentation, high efficiency filter systems for ventilation exhaust, area radiation alarms, and controls.

Instrumentation will be provided to detect leakage from the primary tank to the carbon steel liner of the secondary tank. Equipment will be available for removing the waste from the secondary tank should a primary tank failure occur. Exhaust air will be double-filtered through high-efficiency filters prior to release to the environment. Measurement of radioactivity released to the environment will be continuous, and the concentration of radiosotopes released will be maintained below agency guidelines. Liquid level and temperature instrumentation will be monitored by the Computer Automated Surveillance System. Waste transfer lines will be constructed with encasements for secondary containment of the radioactive waste. Leak detection devices and pressure testing capabilities will be provided for the encased piping to permit routine monitoring for leaks. Leakage into the encasement due to failure of the primary piping will drain to and be collected in double-contained waste storage tanks or catch tanks as required. The support and auxiliary facilities and improvements for control of radioactive waste will include diversion boxes, valve pits, control room modifications, provisions to reduce radiation exposure, and improvements in processes for volume reduction of high-level waste.

1. Title and location of project: 241-AQ tank farm,
Richland, Washington
2. Project No.: 87-D-174

8. Brief Physical Description of Project: (continued)

During construction of the 241-AN tank farm, one of the seven double-shell tanks was constructed with air-lift circulators and the necessary dome penetrations to allow conversion to high-heat waste storage. This project will provide additional components required to complete the conversion: steam heat coil for tank contents preheating; compressed air system, including controls, to power the existing air lift circulators; two sluice pits to aid waste retrieval; ventilation system to remove waste-generated heat; an emergency power supply; and encased piping for transporting high-heat waste to the converted tank.

The FY 1987 appropriation will be used for initiation of Definitive Design and advanced procurement.

9. Purpose, Justification of Need for, and Scope of Project:

The proposed facilities are required for storage of PUREX-generated waste resulting from processing of fuel from the N Reactor, Fast Flux Test Facility, Shippingport, and other Hanford operations. The 1983 and 1984 waste volume projections identified five changes in forecasted Hanford operations which created a need for 3 to 4 million gallons of additional tank space:

- PUREX restart date was moved up from April 1984 to October 1983.
- N Reactor operation was extended from FY 1993 to FY 1995.
- Beginning pretreatment of cladding removal waste and neutralized current acid waste in the late 1980's.
- Dedication of a grout feed tank for 100-N Area waste.
- Extended Plutonium Finishing Plant operation from 1985 to at least 2015.

Preliminary issuance of the 1985 waste volume projections, in May 1985, affirms the need for AQ Tank Farm and further predicts a shortage of high-heat spare, and contingency tank space beginning in FY 1987 until AQ Tank Farm becomes operational in 1993.

Failure to support this project will cause one or more of the following impacts:

- PUREX reprocessing plant operations will have to be curtailed until other methods of storing wastes are provided. (Operational shutdown cost is approximately $160,000 per day.)

- Existing aging waste tanks will be 23 years old by the time construction of this project is completed. In the event of an aging waste tank failure, Hanford will be without adequate spare capability until the project was completed.

- Segregation of feed for the glass vitrification facility will not be possible after filling one existing aging waste tank in 1986. This would require mixing of liquid wastes that should be kept segregated, thus increasing final disposal costs.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: 241-AQ tank farm,
Richland, Washington

2. Project No.: 87-D-174

9. Purpose, Justification of Need for, and Scope of Project:

- o Alternative operating scenarios that provide for no feed pre-treatment would increase the new tank requirement to 10 non-aging waste tanks.
- o Transfer of waste from the existing aging waste tanks to B-Plant will be impacted if additional routing, other than that utilized by PUREX transfers, is not provided. The failure to provide the additional tranfer lines could impact the operations of both PUREX and B-Plant.

These tanks will also provide contingency storage for liquid waste from other Hanford operations and increase the tank farm operating flexibility. The annual estimated operating and surveillance cost of the proposed tank farm and converted tank is approximately $1,000,000 based on the current operating budget. This project includes the engineering, design, inspection, land improvement, and procurement for the construction of four double-shell aging waste tanks and auxiliary facilities at Hanford.

10. Details of Cost Estimate: a/

	Item Cost	Total Costs
a. Engineering, design and inspection at approximately 18 percent of construction costs (item b).............		$ 8,100
b. Construction costs.......................................		44,000
(1) Improvements to land, including earthwork, access roads, fencing, lighting, existing facilities relocation and temporary construction utilities..	$ 2,500	
(2) Buildings - instrumentation, standby generator/compressor, ventilation, service sampling, water treatment and airlift circulator control (approximate total area of 11,500 square feet at $217/sq ft.).....................................	2,500	
(3) Other structures - cooling towers, transfer piping..	3,200	
(4) Utilities - including electrical power, water, air and steam......................................	1,100	
(5) Special facilities - includes tanks, process piping and pits, ventilation and cooling system, instrumentation, auxiliary equipment, agitation system, cathodic protection system and engineered equipment...........................	34,700	

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: 241-AQ tank farm, Richland, Washington	2. Project No.: 87-D-174

10. Details of Cost Estimate: (continued)

	Item Cost	Total Costs
c. Standard equipment....................................		0
d. Removal less salvage....................................		0
Subtotal..............		$ 52,100
e. Contingency at approximately 11 percent of above costs (a and b)......................................		5,900
Total project cost...		$ 58,000

11. Method of Performance:

Design and inspection will be accomplished by the onsite architect-engineer. The majority of the construction effort will be performed by offsite fixed-price contractors. A portion of the work (e.g. work in contaminated areas and the 107-AN tank conversion) will be performed by the onsite CPAF construction contractor.

a/Based on completed conceptual design.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	TOTAL
a. Total project costs								
1. Total facility costs								
a. Construction line item	$ 0	$2,800	$ 7,800	$14,300	$15,700	$12,800	$ 4,600	$58,000
b. PE&D	0	0	0	0	0	0	0	0
c. Inventories	0	0	0	100	0	300	200	600
Total direct costs	$ 0	$2,800	$ 7,800	$14,400	$15,700	$13,100	$ 4,800	$58,600
2. Other project costs								
a. R&D necessary to complete construction	$ 200	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 200
b. Conceptual design costs	500	0	0	0	0	0	0	500

1. Title and location of project: 241-AQ tank farm, Richland, Washington
2. Project No.: 87-D-174

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (continued)

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	TOTAL
c. Other project related costs	400	200	200	200	200	200	200	1,600
Total other project costs	$1,100	$ 200	$ 200	$ 200	$ 200	$ 200	$ 200	$ 2,300
Total project costs	$1,100	$3,000	$ 8,000	$14,600	$15,900	$13,300	$ 5,000	$60,900

b. Other related annual costs (estimated life of project: 50 years)

1. Facility operating costs	$ 1,000
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to programmatic effort in the facility	200
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	0
Total related funding requirements	$ 1,200

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project funding
   1. Total facility
      (a) Inventories - initial stock of spare parts required for operation
   2. Other project costs
      (a) R&D necessary to complete construction - R&D will be performed to develop most appropriate ventilation, agitation, and waste transfer systems/equipment.
      (b) Conceptual design - conceptual design effort for this project.
      (c) Other project related costs - these costs are associated with project management activities of the operating contractor.

b. Total related funding requirements
   1. Facility operating costs - estimated annual expense of $1,000,000 for operation of the new waste storage tank farm including process engineering support, radiation protection to support routine tank farm operations, surveillance acivities, raw water usage, electrical power usage, plant design, planning and scheduing efforts and replacement of non-capital equipment.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: 241-AQ tank farm,
Richland, Washington

2. Project No.: 87-D-174

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

2. Programmatic operating expenses related directly to the facility - This project will primarily support PUREX operations.
3. Capital equipment not related to construction but related to programmatic efforts in the facility - average annual replacement cost for items such as process pumps, agitators, monitoring and processing equipment, etc., is estimated to be $200,000.
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility - funds required for normal tank farm maintenance.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Steam system rehabilitation, phase I, Richland, Washington
2. Project No.: 87-D-175
3. Date A/E work initiated: 2nd Quarter FY 1987
3a. Date physical construction starts: 2nd Quarter FY 1988
4. Date construction ends: 1st Quarter FY 1989
5. Previous cost estimate: None
6. Current cost estimate: $13,500
Less amount for PF&D: 0
Net cost estimate: $13,500
Date: 6/85

7. Financial Schedule:

Fiscal Year	Authorization	Appropriation	Obligation	Costs
1987	$ 900	$ 900	$ 900	$ 900
1988	12,600	12,600	12,600	11,500
1989	0	0	0	1,100

8. Brief Physical Description of Project:

This project is the first phase of a projected two phase effort to upgrade or replace existing 40 year old power houses. Phase I includes construction of a new steam tie-line capable of transferring steam between the existing 200 East and 200 West steam generation and distribution systems. The steam tie-line will be approximately six miles in length and will have capacity of 200,000 pounds per hour of steam. Existing water services, emission controls, coal receiving structures, steam distribution lines and electrical distribution systems will be utilized. The tie-line shall be of standard industrial design and manufacture.

The appropriation for FY 1987 will fund the engineering contract and bid preparation for the steam line construction contract.

9. Purpose, Justification of Need for, and Scope of Project:

This phase of the project will provide additional steam supply from 200 West to supplement steam requirements of the 200 East chemical separation area. The tie-line is an essential prerequisite to Phase II construction.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Steam system rehabilitation, phase I, Richland, Washington	2. Project No.: 87-D-175

9. Purpose, Justification of Need and Scope of Project: (continued)

The present Hanford 200 East and West Area steam plants were built in the early 1940's. Normal operational wear has reduced plant capacities while program growth has greatly increased steam demand in the 200 East Area with 200 West Area demand remaining relatively unchanged.

Current peak steam demand in the East Area exceeds the normal supply capability by approximately 100,000 pounds per hour and normal operational demand requires operation of all five existing boilers for seven months of the year and four boilers the remainder of the year. This operational mode does not allow maintenance at the required intervals, contributes to the further deterioration of the boiler and support systems, and does not provide any reserve capacity in the event of an unscheduled boiler outage. Recent operating history has shown that unplanned steam plant outages result in immediate curtailment of plutonium production operations as well as other support operations required for plutonium production. Unless this condition is corrected, further unplanned steam outages are expected to result in 20 to 70 days of downtime per year. An economic penalty could result in excess of $220,000 per day: $160,000 per day for Chemical Processing Facilities and $60,000 per day for Waste Management Facilities. This results in an impact range of from $4,400,000 to $15,400,000 per year, not including production schedule slippages. The production plants affected by the shortfall are:

- Plutonium Uranium Extraction Facility (PUREX)
- Waste Separation Facility (B-Plant)
- Evaporator/Crystallizer
- Tank Farms

In summary, steam plant production shortfalls have occurred and will continue to occur more frequently as the steam plant components further deteriorate. These shortfalls have impacted and will continue to impact current programs. This project will permit use of excess steam capacity in the 200 West Area for interim needs in the 200 East Area, and will provide an alternate steam supply during Phase II construction.

10. Details of Cost Estimate: a/

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 10.5 percent of construction costs (item b)........................		$ 1,100
b. Construction costs...		10,500
(1) Utilities - steam tieline..	$ 10,500	
c. Standard equipment..		0

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Steam system rehabilitation, phase I, Richland, Washington
2. Project No.: 87-D-175

10. Details of Cost Estimate: a/ (continued)

	Item Cost	Total Cost
d. Removal less salvage..		0
Subtotal..................		$ 11,600
e. Contingency at approximately 16% of above costs.....................		1,900
Total project cost		$ 13,500

a/ Cost estimates are based on completed conceptual design for both phases I and II of the project.

11. Method of Performance:

Definitive design will be performed under a negotiated A/E contract. Procurement and construction will be performed under fixed-price contracts awarded on the basis of competitive bids to the maximum extent possible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1987	FY 1988	FY 1989	TOTAL
a. Total project costs					
1. Total facility costs					
a. Construction line item	$ 0	$ 900	$11,500	1,100	$13,500
b. PE&D	0	0	0	0	0
c. Inventories	0	0	0	0	0
Total direct costs	$ 0	$ 900	$11,500	$ 1,100	$13,500
2. Other project costs					
a. R&D necessary to complete construction	$ 0	$ 0	$ 0	$ 0	$ 0
b. Conceptual design costs	325	0	0	0	325
c. Other project related costs	$ 150	$ 100	$ 100	$ 100	$ 450
Total other project costs	$ 475	$ 100	$ 100	$ 100	$ 775
Total Project Costs	$ 475	$1,000	$11,600	$ 1,200	$14,275

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Steam system rehabilitation, phase I, Richland, Washington

2. Project No.: 87-D-178

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

b. Other related annual costs (estimated life of project: 25 years)

1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to programmatic effort in the facility	100
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	100
Total related funding requirements	$ 200

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project funding
  1. Total facility - no narrative required.
  2. Other project funding
    (a) R&D necessary to complete construction - none.
    (b) Conceptual design - $325,000 conceptual design effort for this project.
    (c) Other project related costs - $450,000 associated with project management and support.

b. Total related funding requirements
  1. Facility operating costs - none.
  2. Programmatic operating expenses directly related to the facility - The steam generated by the coal-fired boilers will be consumed by the Hanford facilities and will be liquidated proportionately to the programmatic users.
  3. Capital equipment not related to construction but related to programmatic efforts in the facility - capital equipment necessary to support operation
  4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility - maintenance required to maintain continuity of operation

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular Dollars in Thousands. Narrative Material in Whole Dollars.)

1. Title and location of project: Test reactor area liquid radioactive waste cleanup system, phase III, Idaho National Engineering Laboratory (INEL), Idaho

2. Project No.: 87-D-177

3. Date A-E work initiated: 1st Quarter FY 1987

3a. Date physical construction starts: 2nd Quarter FY 1988

4. Date construction ends: 4th Quarter FY 1990

5. Previous cost estimate: None
Date:

6. Current cost estimate: $ 5,500
Less amount for PE&D: 0
Net cost estimate: $ 5,500
Date: 3/86

7. Financial Schedule:

Fiscal year	Authorization	Appropriations	Obligations	Costs
1987	$ 700	$ 700	$ 700	$ 400
1988	3,900	3,900	3,900	1,100
1989	900	900	900	1,600
1990	0	0	0	2,400

8. Brief Physical Description of Project:

This project consists of modifications at the Test Reactor Area (TRA) to implement Phase III of the TRA Liquid Waste Control Program. The objective is to eliminate release of radioactive and hazardous liquid from TRA. To accomplish this, the liquid waste that is collected by the warm drain systems at TRA facilities and processed by the equipment installed during Phase II will be stored in two 60,000 gallon tanks at the Materials Test Reactor Process Water Building and one 10,000 gallon tank at the Advanced Test Reactor (ATR). The water stored in the tanks will be recycled back to ATR and the Materials Test Reactor (MTR) to be used in some of the water make-up systems. A cross-tie between liquid waste streams will also be provided for existing canals located at two low-power nuclear reactor facilities within TRA. Additional cooling will be provided for one of these facilities which requires extremely close temperature control. An existing liquid radioactive waste leaching pond will be lined with a waterproof barrier to prevent seepage from reaching the aquifer. The pond will then allow solar evaporation of liquid, eliminating all direct liquid waste discharges from TRA.

The budget authority of $700,000 requested in FY 1987 would allow Title I, preliminary design, to be completed by the third quarter FY 1987. Title II, final design, would be approximately 50 percent complete by the end of FY 1987.

1. Title and location of project:	Test reactor area liquid radioactive waste cleanup system, phase III, Idaho National Engineering Laboratory (INEL), Idaho	2. Project No.: 87-D-177

8. Brief Physical Description of Project: (continued)

Long lead Government-furnished material (GFM) procurement commitments for instrumentation and pumps will be made during the fourth quarter FY 1987. Project management activities for design development and long lead procurement initiations is included in the FY 1987 BA/BO estimate.

9. Purpose, Justification of Need for, and Scope of Project:

TRA radioactive liquid waste discharge consists primarily of effluents from the ATR. Other sources include effluents from several other nuclear facilities and radiochemistry laboratories. Most of these facilities were built in the 1950's and early 1960's when the use of ion exchange in the soil (a leaching pond) was an acceptable method of removing radioactivity from liquid waste. Acceptable radioactive discharge levels during that period followed controlled area release guidelines for liquid waste.

Present DOE Orders require the use of alternatives other than the use of soil columns to remove radioactivity from waste, and are to be implemented as soon as technically and economically practicable. This philosophy also redefines the acceptable discharge levels as the uncontrolled area release guidelines. Past TRA discharges were typically 140 million gallons per year of radioactive liquid, containing approximately 1,900 curies of treatable radioactivity and up to 300 curies of tritium. Based on 1975 data, TRA discharges were greater than 20 times the treatable discharges from all commercial nuclear power plants combined.

As a result of phased cleanup efforts initiated in 1975 by the TRA Water Recycle and Pollution Control (Phase I) project, discharges were reduced to about 42 million gallons per year and 130 curies per year of treatable radioactivity, excluding tritium. Construction was completed on this project in 1980. The 1981 TRA Cleanup System (Phase II) project continues the treatment of this waste and is anticipated to further reduce the discharge to 13 million gallons per year and approximately 50 curies per year of treatable radioactivity, excluding tritium. This current phase is scheduled to be completed in 1985.

The project proposed by this request represents the final phase: reducing direct radioactive liquid effluents from TRA to zero. Projects completed to date have met or exceeded the anticipated effluent reductions. Neither the Phase I nor the Phase II projects were expected to reduce tritium discharges from TRA, and this radioactivity is still expected to exceed leaching pond soil discharge requirements.

The tritium discharges from TRA liquid waste range from about 100 to 300 curies per year. A 5-year average indicated that about 40 percent of the total tritium discharged in liquid on the INEL is from TRA. This radioactive isotope is chemically similar to hydrogen, a constituent of water; and as such, the tritium is not removed by normal treatment processes, including the now unacceptable leaching pond treatment. As a result, the majority of the tritium discharged from TRA reaches the aquifer. Studies have shown that tritium is present in the aquifer, and its migration is being closely monitored. However, significant public pressure exists for the termination of all tritium discharges. This project will

1. Title and location of project: Test reactor area liquid radioactive waste cleanup system, phase III, Idaho National Engineering Laboratory (INEL), Idaho

2. Project No.: 87-D-177

9. Purpose, Justification of Need for, and Scope of Project: (continued)

eliminate all radioactive liquid discharges from TRA; therefore, it will prevent tritium from entering the aquifer and allow TRA to meet current soil discharge guidelines. As explained above, a deferral of funding will result in a continued annual discharge of approximately 100 to 300 curies of tritium, as well as 50 curies of mixed activation and fission products into the leaching pond and potentially to the aquifer.

10. Details of Cost Estimate:*

	Item Cost	Total Cost
a. Engineering, design,* inspection at approximately 12% of item b		$ 480
b. Construction costs		3,860
(1) Improvements to land (clearing, grading, backfill, sheeting, fencing)	$ 660	
(2) Buildings and structures (excavation, concrete, steel, roofing, H&V, insulation)	910	
(3) Utilities (water, steam and condensate, electrical, air)	220	
(4) Equipment (piping, valves, heaters, ion exchanger, pumps, filters, tanks, instruments) .	2,010	
(5) Demolition and removal (concrete cutting, piping reroute, excess equipment removal)	60	
c. Contingency at approximately 27% of above costs**		1,160
Total estimated costs		$ 5,500

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* Based on conceptual design at 100 percent complete.

** Contingency costs reflect the inability to accurately assess both the degree of radioactivity that will be encountered in contaminated areas and the costs for connecting with numerous operating systems throughout the plant. The latter will involve intricate coordinating with yet-to-be established schedules.

11. Method of Performance:

The responsibility for design and project management will be assigned to the INEL prime contractor as administered by DOE-Idaho. The construction will be accomplished by contracts and subcontracts awarded on the basis of competitive bidding.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Test reactor area liquid radioactive waste cleanup system, phase III, Idaho National Engineering Laboratory (INEL), Idaho

2. Project No.: 87-D-177

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior yrs.	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project costs						
(1) Total facility costs						
(a) Construction line item	$ 0	$ 400	$ 1,100	$ 1,600	$ 2,400	$ 5,500
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total direct costs	0	400	1,100	1,600	2,400	5,500
(2) Other project costs						
(a) R&D necessary to complete construction	125	0	0	0	0	125
(b) Other project related costs .	0	0	0	0	100	100
Total other project costs ...	125	0	0	0	100	225
Total project costs (items 1 & 2)	$ 125	$ 400	$ 1,100	$ 1,600	$ 2,500	$ 5,725

b. Other related annual costs (estimated life of project: 20 years)

(1) Facility operating cost (annual)	$ 55
(2) Programmatic operating expenses directly related to the facility (annual)	75
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	0
(4) GPP or other construction related to programmatic effort in the facility	0
(5) Other costs	0
Total other related annual costs	$ 130

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
   (1) Total facility costs
      (a) Construction line item - cost to build this project.
      (b) PE&D - none requested.
      (c) Expense funded equipment - none requested.
      (d) Inventories - none required.

1. Title and location of project: Test reactor area liquid radioactive waste cleanup system, phase III, Idaho National Engineering Laboratory (INEL), Idaho

2. Project No.: 87-D-177

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements: (continued)

(2) Other project costs
  - (a) R&D necessary to complete construction - to date, approximately $125,000 has been spent on conceptual design.
  - (b) Other project related costs - approximately $100,000 will be spent for start-up testing, documentation revisions, training, and initial supplies.

b. Other related annual costs

(1) Facility operating costs - the estimate includes additional labor, material, and energy costs to operate the facility which are not included in programmatic expenses below.

(2) Programmatic operating expenses directly related to the facility - the estimate is based on the projected FY 1987 operating expenses for those TRA facility programs which produce liquid radioactive waste to be recycled by this project.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste & Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Burial ground expansion, Savannah River, South Carolina

2. Project No.: 87-D-180

3. Date A-E work initiated: 1st Quarter FY 1987

5. Previous cost estimate: None

3a. Date physical construction starts: 3rd Quarter FY 1987

6. Current cost estimate: $14,500
Date: 4/85

4. Date construction ends: 3rd Quarter FY 1988

7. *Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$ 6,300	$ 6,300	$ 6,300	$ 5,100
1988	8,200	8,200	8,200	9,400

8. Brief Physical Description of Project:

This project provides for the design and construction of an approximately 100 acre expansion to the existing burial ground to meet present and forecasted requirements for radioactive waste disposal. This facility will meet the requirements and standards of waste management practices in DOE Order 5820.2.

The design basis facility location is north and northeast of the present burial ground. Site selection will be through the NEPA process. This project will include:

- Site preparation - clearing and leveling.
- Drainage.
- Monitoring.
- Security fencing.
- Standard heavy equipment (i.e., one small wide track bulldozer, one large bulldozer, two self elevating scrappers, one 150 ton shielded crane).
- Area security lighting.
- Railroad spur from adjacent tracks.
- Construction of initial waste disposal units. Further disposal units will be funded by Burial Ground operating funds.

*The accelerated schedule required for this project is achievable because the majority of project activities involve civil engineering and site improvement.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Burial ground expansion, Savannah River, South Carolina 2. Project No.: 87-D-[illegible]

8. Brief Physical Description of Project: (continued)

Decommissioning cost of the 100 acre burial ground expansion is estimated to be $1,000,000 (FY 1985 dollars) at the end of the approximately 20 year expected life. Decommissioning will be in accordance with current acceptable practice.

FY 1987 funds will provide design, placing of purchase orders for long lead procurement items such as a crane and bulldozers, site preparation, and initial disposal units.

9. Purpose, Justification and Need for, and Scope of Project:

The existing burial ground will be filled by mid-1988 despite implementation of programs to incinerate waste and compact waste for more efficient space utilization.

The purpose of this project is to provide sufficient additional burial facilities to meet forecasted radioactive waste disposal requirements at Savannah River through approximately the year 2008.

Operation of improved confinement disposal facilities (grouted boreholes and an engineered trench with concrete stabilized waste), are required in order to improve waste management practices, and will result in better containment of radionuclides (e.g. tritium).

If this project is delayed or not approved, plutonium and tritium production at Savannah River will be curtailed because radioactive waste from these production processes must be immediately disposed of.

Immediate disposal is necessary because storage of radioactive waste presents safety and environmental problems.

The standard equipment is required for replacement of old equipment scheduled for retirement. Improved disposal methods require the ability to move and handle large amounts of soil efficiently.

10. Details of Cost Estimate: a/

	Item Cost	Total Cost
a. Engineering design & inspection at approximately 7.5% of construction costs........................		$ 850
b. Construction costs................................		11,375
(1) Improvements to land........................	$ 5,420	
(2) Other structures - disposal/storage units...	2,600	
(3) Special facilities - monitoring wells........	120	

a/ The above estimates are based on conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Burial ground expansion, Savannah River, South Carolina — 2. Project No.: 87-D-102

10. Details of Cost Estimate a/ (continued)

	Item Cost	Total Cost
(k) Utilities - electrical	$ 450	
(l) Standard equipment	2,500	
(a) Small bulldozer (D6E)* 62		
(b) Large bulldozer (D8E)* 203		
(c) Two scrapers (D8E)* 760		
(d) 150 ton crane (D8E)* 1,475		
c. Contingency at approximately 15% of above costs		1,825
d. Standard costs		450
Total estimated costs		$ 14,500

*Estimate supplied by SRP (vendor quote).

11. Method of Performance:

Design will be performed by the operating contractor. Construction and procurement will be accomplished by the operating contractor, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

Prior Years	Prior Years	FY 1986	FY 1987	FY 1988	Total
a. Total project costs					
1. Total facility costs					
(a) Construction line item	$ 0	$ 0	$ 5,100	$ 9,400	$14,500
(b) PE&D	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0
(d) Inventories	0	0	0	0	0
Total facility costs	0	0	5,100	9,400	14,500
2. Other project costs					
(a) R&D	0	0	0	0	0
(b) Conceptual design & engineering studies	100	130	0	0	230
(c) Other project related costs	0	0	0	0	0
Total other project costs	100	130	0	0	230
Total project costs (item 1 & 2)	$ 100	$ 130	$ 5,100	$ 9,400	$14,730

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Burial ground expansion, Savannah River, South Carolina	2. Project No.: 87-D-180

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (continued)

b. Other related annual costs (estimated life of project: 20 years)

	Annual Cost
1. Facility operating costs	$ 200
2. Programmatic operating expenses directly related to the facility	500
3. Capital equipment not related to construction but related to the programmatic effort in the facility	200
4. GPP or other construction related to programmatic effort in the facility	100
Total other related annual funding requirements	$ 1,000

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
   1. Total facility costs
      (a) Construction line item
      (b) PE&D - no PE&D funding is required.
      (c) Expense funded equipment - none.
      (d) Inventories - no inventories are needed for the proposed facilities.
   2. Other project costs
      (a) R&D - not required.
      (b) Conceptual design and engineering studies - $330,000 will provide preparation of a cost estimate for project authorization and performing sub-surface soils investigation and topographic survey.
      (c) Other project related costs - none.

b. Total related annual costs
   1. Facility operating costs - $200,000 (incremental cost) includes utilities, labor, and materials.
   2. Programmatic operating expenses directly related to the facility - Operating expenses to supply new waste disposal storage units as old units are filled.
   3. Capital equipment not related to construction but related to the programmatic effort in the facility - $200,000 includes replacement of old equipment.
   4. GPP or other construction related to programmatic effort - $100,000 includes expansion of personnel facilities.
   5. Other costs - none.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste & Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Diversion box and pump pit containment buildings, Savannah River, South Carolina

2. Project No.: 87-D-181

3. Date A-E work initiated: 2nd Quarter FY 1987

3a. Date physical construction starts: 1st Quarter FY 1988

4. Date construction ends: 2nd Quarter FY 1990

5. Previous cost estimate: None

6. Current cost estimate: $17,300
Date: 12/84

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$ 1,360	$ 1,360	$ 1,360	$ 700
1988	6,800	6,800	6,800	5,500
1989	6,350	6,350	6,350	7,500
1990	2,790	2,790	2,790	3,600

8. Brief Physical Description of Project:

This project will provide metal building enclosures over five existing radioactive waste transfer pump pit and diversion box facilities in the F and H Area waste tank farms.

Each building will have a remotely-operated bridge crane capable of completing all equipment change operations in diversion boxes or pump pits. The crane will be operated from a remote console outside each building. Remotely operated TV cameras will allow viewing of work underway.

Each building will have a ventilation system maintaining a lower than atmospheric pressure. Building exhaust will be through HEPA filters. The building ventilation system provides containment in addition to the existing process ventilation system and complies with design criteria outlined in DOE Order 6430. Airflow into each diversion box or pump pit will be 50 linear feet per minute when shielding covers are removed, to prevent spread of contamination.

This project will provide all the equipment required to perform all remote operations in the pump pits and diversion boxes.

1. Title and location of project: Diversion box and pump pt containment buildings, Savannah River, South Carolina

2. Project No.: 87-D-181

8. Brief Physical Description of Project: (continued)

Decommissioning costs for these buildings are estimated to be $1,000,000 (FY 87 dollars) at the end of the 30 year expected life. Decommissioning is expected to involve decontamination, dismantlement, and final disposal as radioactive waste at the Savannah River burial ground.

FY 1987 funds will provide design, initial construction work, and procurement of HEPA filters.

9. Purpose, Justification of Need for, and Scope of Project:

This project will prevent 5 to 6 weeks of lost operation per year after FY 1990 for the materials production program, waste management evaporators and DWPF. This project provides bildings and equipment to allow all weather, remote, contained work in diversion boxes and pump pits requiring frequent access and which have significant impact on materials production or waste management operations.

Justification for this project is based on the need to mantain operating continuity for interim waste tank farm operations, long-term waste operations (Defense Waste Processing Facility) and materials production in order to avoid costly shutdowns. Production schedules depend on timely maintenance and jumper and equipment changes in diversion boxes and pump pits to accommodate waste transfers.

By FY 1990, materials production and waste operations wil be more dependent on timely work in diversion boxes and pump pits, especially after DWPF startup in 1989. The frequeny of all types of waste transfers is increasing. This causes an increase in required maintenance and jumper changes. Forthe first time, production is becoming dependent on successful transfers between the two waste tank farms.

Existing diversion box and pump pit facilities are expose to the weather. About 40 percent of all work in these facilities during 1983 was delayed due to high winds or iclement weather. Delays of as much as 2 weeks have occurred. Some delay is tolerable, but in 1983, three delays affectd operation of materials production facilities.

These facilities will allow all-weather work in diversionboxes and pump pits. Statistically, without weather protection, more than 5 weeks of additional annual downtime could reslt for materials production facilities, waste tank farm evaporators and DWPF. With this project, the cost of savd downtime would be about $2,300,000 per year. The first year return on investment would be 13 percent.

About 100 intertank transfers per year will occur to supprt the waste transfer program and to provide feed to waste management evaporators. About 500 liquid waste transfersare made yearly from materials production facilities to waste management tank farms. Transfers between the tank farms will average 10 per year. About 15 transers per year, including 5 from F Area, will be made to waste tanks which feed the DPF. These transfers are routed through diversion boxes and pump pits.

1. Title and location of project: Diversion box and pump pit containment buildings, Savannah River, South Carolina

2. Project No.: 87-D-181

9. Purpose, Justification of Need for, and Scope of Project: (continued)

In addition, remote equipment provided by the project will reduce radiation exposure to operating personnel by about 15 REM per year. This represents a savings of more than 20 percent of the annual radiation exposure due to waste management operations.

If the project is delayed or not authorized, materials production facilities, waste tank farm evaporators and the DWPF may experience an estimated 5 to 6 weeks downtime per year.

10. Details of Cost Estimate:

Item		Item Cost	Total Cost
a. Engineering design & inspection at approximately 14% of construction costs 1/			$ 1,650
b. Construction costs			11,935
(1) Improvements to land		$ 365	
(2) Buildings		3,160	
(a) FDB2 and FPP1 4134 SF	$ 785		
(b) FDB4 and FPP2 and 3 4386 SF	825		
(c) HDB7 2200 SF	460		
(d) HPP5 and 6 3660 SF	675		
(e) HCTS PP 1665 SF	415		
(3) Special facilities		8,410	
(a) Equipment	5,755		
(b) Piping	345		
(c) Instruments	450		
(d) Electrical	1,860		
c. Removal costs			890
Subtotal			$ 14,475
d. Contingency at approximately 17% of above cost 2/			2,525
e. AED allowance - design and construction liaison, checkout and acceptance 1/			300
Total estimated costs			$ 17,300

1/Engineering Design and AED allowance include a limited amount of inspection costs for special equipment. The majority of the inspection costs are reflected in construction costs, Item 10b.

2/Contingency is 17% to allow for uncertainties for construction in existing operating facilities, radiation zones and regulated areas.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Diversion box and pump pit containment buildings, Savannah River, South Carolina

2. Project No.: 87-D-181

11. Method of Performance:

Design will be performed by the operating contractor. Construction and procurement will be accomplished by the operating contractor, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

Prior Years	Prior Years	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project costs							
1. Total facility costs							
(a) Construction line item	$ 0	$ 0	$ 700	$ 5,500	$ 7,500	$ 3,600	$17,300
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	$ 0	$ 0	$ 700	$ 5,500	$ 7,500	$ 3,600	$17,300
2. Other project costs							
(a) R&D	0	0	0	0	0	0	0
(b) Conceptual design	100	300	0	0	0	0	400
(c) Other project related costs	0	0	0	0	0	0	0
Total other project costs	100	300	0	0	0	0	400
Total project costs (Item 1 & 2)	$ 100	$ 300	$ 700	$ 5,500	$ 7,500	$ 3,600	$17,700

b. Other related annual costs (estimated life of project: 30 years)

	Annual Cost
1. Facility operating costs	$ 50
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	50
4. GPP or other construction related to programmatic effort in the facility	0
Total other related annual funding requirements	$ 100

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Diversion box and pump pit
containment buildings,
Savannah River, South Carolina

2. Project No.: 87-D-181

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
    1. Total facility costs
        (a) Construction line item - this is for design, construction, and plant liaison.
        (b) PE&D - none.
        (c) Expense funded equipment - none.
        (d) Inventories - none.
    2. Other project costs
        (a) R&D - none.
        (b) Conceptual design and engineering studies - $400,000 for preparation of estimates for authorization.
        (c) Other project related costs -

b. Total related annual costs
    1. Facility operating costs - $50,000 for increased utility costs.
    2. Programmatic operating expenses directly related to the facility - none.
    3. Capital equipment not related to construction but related to the programmatic effort in the facility - $50,000 for replacing worn capital equipment.
    4. GPP or other construction related to programmatic effort - none.
    5. Other costs - none.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular Dollars in Thousands. Narrative Material in Whole Dollars.)

1. Title and location of project: B-Plant F-filter, Richland, Washington

2. Project No.: 86-D-172

3. Date A-E work initiated: 2nd Quarter FY 1986

5. Previous cost estimate: None

3a. Date physical construction starts: 1st Quarter FY 1987

6. Current cost estimate: $4,000
Less amount for PE&D: 0
Net estimate: $4,000
Date: 3/84

4. Date construction ends: 4th Quarter FY 1988

7. Financial Schedule:

Fiscal Year	Authorization	Appropriation	Obligation	Costs
1986	$ 1,000	$ 949	$ 949	$ 435
sequestered 1986	0	(51)	(51)	(15)
1987	3,000	3,000	3,000	2,400
1988	0	51	51	1,165

8. Brief Physical Description of Project:

This project will provide a sixth filter cell (F-Filter) to serve B-Plant. F-Filter will incorporate features which help assure an estimated service life in excess of 15 years.

The filter will consist of an underground, reinforced concrete cell and above ground instrument building. The cell will house a minimum of four stages of high-efficiency particulate air (HEPA) filters which will be arranged and equipped to permit controlled bypassing of filters upstream of the two final filter banks at an appropriate time during operation.

The bypass mechanism will provide operating control of the Pressure Drop (PD) across the filter bank. Diverting a controlled amount of air around the filter bank reduces the PD and the filter can remain in service as a high efficiency prefilter. This is expected to extend the life of the downstream filter banks so as to achieve a service life in excess of 15 years.

The design of the project will be completed with the FY 1986 appropriation. Physical construction will be accomplished in FY 1987 and FY 1988.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: B-plant F-filter,
Richland, Washington

2. Project No.: 86-D-172

9. Purpose, Justification of Need for, and Scope of Project:

The B-Plant canyon exhaust filtration system is comprised of underground concrete cells equipped with prefilters, HEPA filters and an emergency back-up sand filter. At the present time the fourth filter cell (D-Filter) is in use and the fifth filter (E-Filter) has been built and waits off line as a spare. E-Filter will become the primary canyon filter when D-Filter reaches the end of its service life in FY 1987. The F-Filter is required to serve as a spare to E-Filter.

The sand filter exists as an emergency spare but is of inadequate capacity to support the plant's operating requirement of maintaining negative-to-atmosphere pressure in the canyon, thereby endangering the health and safety of operating personnel.

Experience with the A-, B-, C-, and D-Filter's rate of radiation accumulation shows that the expeditious repair of filters is impossible.

To maintain plant operating schedules and assure continued compliance with environmental release and health and safety standards, a sixth canyon filter is required.

If this project is not supported, a release to the environment could halt plant operations at a cost and schedule impact of approximately $40,000 per day, while at the same time endangering the health and safety of operating personnel.

10. Details of Cost Estimate: a/

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 26% of construction costs (item b)	$	$ 620
b. Construction costs		2,680
(1) Improvements to land	45	
(2) Building 3850 sq ft @ $590/sq ft	2,270	
(3) Utilities (including raw water lines electrical power and compressed air)	65	
(4) Special facilities (filter frames)	250	
(5) Standard equipment (HEPA filters)	50	
c. Contingency at approximately 21% of items a and b		700
Total estimated cost		$ 4,000

a/ This estimate is based on conceptual design effort that is 95% complete.

1. Title and location of project: B-plant F-filter,
Richland, Washington

2. Project No.: 86-D-172

11. Method of Performance:

Design and inspection will be performed by the onsite architect-engineer contractor. Construction and procurement will be performed by the onsite construction contractor (i.e., for excavation and tie-ins, etc., that involve "hot" work) and by an offsite contractor on a fixed price contract. The installation of filter assemblies shall be performed by the operating contractor, when E-Filter reaches the end of its service life.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

Not applicable to projects with a total estimated cost (TEC) of less than $5 million.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not applicable to projects with a TEC of less than $5 million.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management
(Tabular Dollars in Thousands. Narrative Material in Whole Dollars.)

1. Title and location of project: Low-level waste processing and shipping system, Feed Materials Production Center, Fernald, Ohio

2. Project No.: 86-D-174

3. Date A-E work initiated: 1st Quarter FY 1986

3a. Date physical construction starts: 4th Quarter FY 1986

4. Date construction ends: 4th Quarter FY 1988

5. Previous cost estimate: $17,000
Date: 5/84

6. Current cost estimate: $17,000
Less amount for PE&D 0
Net cost estimate $17,000
Date: 10/84

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$ 2,500	$ 2,372	$ 2,372	$ 1,400
sequestered 1986	0	(128)	(128)	0
1987	10,000	10,000	10,000	9,000
1988	4,500	4,628	4,628	6,600

8. Brief Physical Description of Project:

The low-level waste processing and shipping (LLWPS) system will be located mainly within Plant 8 at the Feed Materials Production Center (FMPC). This project will provide facilities to process liquid and solid low-level waste (LLW) into a form suitable for shipment and off-site disposal. More than 40 different waste streams, wet and dry, burnable and non-burnable, are generated at FMPC. Of these, two account for 80 percent of the waste generated, six account for 93 percent, and 14 account for 96 percent. The facility will be designed and sized to handle all major radioactive waste streams, and consists of two major subsystems: waste processing and waste packaging/shipping.

The waste processing subsystem may include: 1) a filtration unit to receive, store and dewater the two main wet waste streams from the plant; 2) a drying or immobilization unit, such as a rotary kiln, to dry, oxidize or otherwise stabilize several of the waste streams; 3) a roasting unit, such as an oxidation furnace, which will oxidize wastes which cannot be handled in the drying unit; 4) a solids handling unit, which will reduce the volume of large pieces of waste via crushing, shredding, and milling; 5) the Plant 8 collection unit, which will serve as a central collection point for solids from other points in the FMPC prior to packaging; and 6) the Plant 2 transfer unit, which will transport solids generated in Plant 2 to the Plant 8 collection unit.

1. Title and location of project: Low-level waste processing and shipping system, Feed Materials Production Center, Fernald, Ohio

2. Project No.: 86-D-174

8. Brief Physical Description of Project: (continued)

The waste packaging/shipping subsystem may include: 1) the Plant 8 drum filling unit, which will fill drums with waste, weigh the drums, and seal them; and 2) the Plant 8 drum washing unit, which will decontaminate the exterior surfaces of the filled and sealed drums prior to shipment.

The project also includes all necessary fire protection; safety; heating, ventilation, and air conditioning (HVAC) system; mechanical and electrical support; and environmental pollution monitoring and control systems.

9. Purpose, Justification of Need for, and Scope of Project:

Past waste management practices involved the use of large, lined pits for the storage of solid and liquid LLW. The use of waste pits is no longer acceptable and an alternate waste management strategy has been selected. Shipment and off-site disposal in an approved LLW disposal facility will ultimately eliminate the risk of local ground water contamination and provide permanent disposal of the waste as opposed to temporary storage, which is ultimately much more expensive.

Waste management problems have been intensified by the new National Pollutant Discharge Elimination System (NPDES) permit for National Lead of Ohio (NLO), Inc., that became effective on November 1, 1980, and which became more restrictive in 1984. Two immediate problems arise from these regulations: 1) the copper content of waste liquor and 2) the stringent future requirements for new solids retention facilities. These problems are interrelated, as are discharge problems with other materials covered by the NPDES permit.

The timing of this new facility is critical because the existing facilities are not adequate to process current or projected waste streams for shipping. Interim measures for processing and shipping the waste are being implemented to bridge the time period until permanent facilities are available. The interim facilities are used on a space-available basis. When not available, the unprocessed waste must be stored onsite in drums. The need for this facility is made even more critical when considering the waste management impacts of a planned doubling of plant output of nuclear materials by the end of 1987.

A lack of funding for this project will result in the inability to adequately process all FMPC waste streams for shipment and disposal. This will result in continued onsite storage of waste which does not meet disposal site waste acceptance criteria (about 75 percent of the waste).

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Low-level waste processing and shipping system,
Feed Materials Production Center, Fernald, Ohio

2. Project No.: 86-D-174

10. Details of Cost Estimate:

		Item Cost	Total Cost
a. Engineering, design, and inspection at approx. 16% of construction costs, item b			$ 1,910
(1) Title I and II		$ 1,370	
(2) Title III		530	
(3) Project management		10	
b. Construction costs			11,710
(1) Land improvements		160	
(2) Building addition which includes fire protection, freight elevator and loading dock - 8,300 ft (squared) at $146/ft (sq'd) 167,000 ft (cubed) at $7.25/ft (cubed)		1,210	
(3) Special facilities		10,340	
(a) Rotary kiln	$2,600		
(b) Oxidation furnace	1,200		
(c) Mill	280		
(d) Shredder	250		
(e) Belt conveyor	180		
(f) Off-gas cleaning system	500		
(g) Other equipment and process-related work such as piping, lighting, power, instrumentation, HVAC, etc.	5,330		
c. Contingency, at approximately 25% of the sum of items a and b			3,380
Total estimated costs			$ 17,000

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Low-level waste processing and shipping system, Feed Materials Production Center, Fernald, Ohio

2. Project No.: 86-D-174

11. Method of Performance:

Design and inspection will be on the basis of a negotiated architect-engineer contract. To the extent feasible, construction and procurement is to be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Yrs.	FY 1986	FY 1987	FY 1988	Total
a. Total project funding					
(1) Total facility costs					
(a) Construction line item............	$ 0	$ 1,400	$ 9,000	$ 6,600	$ 17,000
(b) PE&D..............................	0	0	0	0	0
(c) Expense funded equipment..........	0	0	0	0	0
(d) Inventories.......................	0	0	0	0	0
Total facility costs........	$ 0	$ 1,400	$ 9,000	$ 6,600	$ 17,000
(2) Other project costs					
(a) Development necessary to complete construction............	408	0	0	0	408
(b) Other project related costs.......	290	0	0	0	290
Total other project funding.....	698	0	0	0	698
Total project funding (item 1 & item 2)...............	$ 698	$ 1,400	$ 9,000	$ 6,600	$ 17,698

b. Other related annual costs (estimated life of project: 20 years)

(1) Facility operating costs..	$1,323
(2) Programmatic operating expenses directly related to the facility.............	1,785
(3) Capital equipment not related to construction but related to the programmatic effort in the facility....................................	0
(4) GPP or other construction related to programmatic effort in the facility......	0
(5) Other costs...	0
Total related annual costs..	$3,108

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Low-level waste processing and shipping system, Feed Materials Production Center, Fernald, Ohio

2. Project No.: 86-D-174

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project funding	
(1) Total facility costs	
(a) Construction line items	$17,000,000
(b) PE&D funding	Not applicable
(c) Expense funded equipment	Not applicable
(d) Inventories	Not applicable
(2) Other project funding	
(a) Development necessary to complete construction (includes $138,000 for preparation of the design criteria, preparation of the Project Management Plan, and other support activities. Also included is $270,000 for miscellaneous development items as identified in the CDR.	408,000
(b) Conceptual design engineering	290,000
b. Total annual related funding requirements	
(1) Facility operating costs (includes the cost of materials, wages, maintenance and other direct operating costs [e.g., packaging waste for shipment])	1,323,000
(2) Programmatic operating expenses directly related to the facility (includes the indirect and G&A costs applied to the maintenance and operating labor wages, as well as $1,076,000 for off-site shipping and $385,000 for disposal charges	1,785,000
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	Not applicable
(4) GPP or other construction	Not applicable
(5) Other costs	Not applicable

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular Dollars in Thousands. Narrative Material in Whole Dollars.)

1. Title and location of project: INEL security upgrade,
Idaho National Engineering Laboratory (INEL), Idaho

2. Project No.: 86-D-175

3. Date A-E work initiated: 1st Quarter FY 1986

3a. Date physical construction starts: 3rd Quarter FY 1986

4. Date construction ends: 2nd Quarter FY 1988

5. Previous cost estimate: NONE
Less amount for PE&D:
Net cost estimate:
Date:

6. Current cost estimate: $10,000
Less amount for PE&D: 0
Net cost estimate: $10,000
Date: 3/85

7. Financial Schedule:

Fiscal Year	Authorization	Appropriation	Obligations	Costs
1986	$ 2,000	$ 1,958	$ 1,958	$ 1,958
sequestered 1986	0	(42)	(42)	(42)
1987	7,300	7,300	7,300	7,000
1988	700	742	742	1,042

8. Brief Physical Description of Project:

This project provides for the design, procurement and construction of DOE Security facilities at several locations at Idaho National Engineering Laboratory (INEL) to replace the current security headquarters at the Central Facility Area (CFA) and to accommodate expanded security functions where required. Planned facilities include:

a. Vehicle access control guard stations

Certain access control guard station upgrading will be required for interfacing with other security system enhancements/upgrades at the INEL.

b. INEL Security Complex

The INEL security complex will consist of a security headquarters building and a Special Response Team (SRT) headquarters. A security fence will be constructed around the security complex and access control provided. All areas will be well lighted and security alarmed.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: INEL security upgrade, Idaho National Engineering Laboratory (INEL), Idaho

2. Project No.: 86-D-175

8. Brief Physical Description of Project: (continued)

(1) Security headquarters building

This building will be provided with power, water, sewer, communications, a normal heating, ventilating, and air conditioning (HVAC) system, and a hardened central alarm system and armory.

It will house offices of the security force contractor, locker areas for men and women, training and conference rooms, and other required support areas.

The proposed new security headquarters building will include the following features:

(a) Security alarms and computer system functions.

(b) Emergency utilities and supplies for maintaining counter measure capability for extended periods when normal site support utilities are not available.

(2) SRT headquarters and response vehicle facilities

This facility will be a central response area located adjacent to the existing security Helicopter Maintenance Facility. It will house the SRT operations support areas and will include administrative offices, helicopter overhaul and parts area, a security vehicle garage with "ready line" parking, an armory and ammunitions storage area, and a lodging area with kitchen facilities for personnel and related equipment.

c. Security badging facility

The security badging facility will be constructed adjacent to the main guard station and will replace existing temporary trailers. The security badging facility will accommodate a badging counter, computer terminals, public restrooms, administrative office area, outside parking areas, and other improvements and modifications as needed.

d. Weapons range

The existing INEL weapons range will be upgraded to meet the needs of the enhanced security guard force. Such upgrades will include earth berming, lighting, communications, control towers, and weather shelters, as required. The range will be reconfigured as a multi-purpose range and stress course.

1. Title and location of project: INEL security upgrade,
Idaho National Engineering Laboratory (INEL), Idaho

2. Project No.: 86-D-175

9. Purpose, Justification of Need for, and Scope of Project:

This project is being requested consistent with the requirements identified in both the Safeguards and Security Master Plan for the DOE Idaho Operations Office dated April 16, 1984, and the INEL Five-Year Plan dated September 28, 1983. The purpose of this project is to replace and upgrade existing security-related facilities, both permanent and temporary to provide capacity for the expanding role of the security forces at the INEL. The INEL security force almost tripled in size during FY 1984, and many temporary measures have been implemented to handle this increase. Existing facilities have been stretched beyond their normal capacity to help meet the needs of the security forces. This project alleviates crowding and improves operating efficiencies.

The project is needed to enable the INEL to meet the guidelines of DOE Order 5632, Draft 10/11/84, on a continuing basis. Specifically included are the following:

A. Vehicle Access Control Guard Stations

These permanent, guard stations will replace existing, portable guard houses which were set up on a temporary basis during FY 1984 as security enhancements. These stations will meet DOE security requirements and will control INEL ingress and egress.

B. INEL Security Headquarters Complex

1. Security Headquarters Building

The present INEL security headquarters at CFA, which houses administrative offices and serves as the site security training center, does not meet DOE security requirements. Training facilities have been temporarily located in one building and two double-wide trailers near the present INEL security headquarters. This arrangement is inefficient and hampers communications. The existing headquarters building has the following inadequacies:

- o With approximately 6,400 sq. ft. on two floors, it serves as the backup security response post for the primary site operating facilities; all security alarms from these facilities go to this building. Backup security action is currently dispatched from this location (i.e., SRT, helicopters, etc.).
- o The existing space is not sufficient to provide the command post functions for expanded site security. Approximately 30% of the building is used for safeguards and security functions, and approximately 70% is used for administrative purposes.

1. Title and location of project: INEL security upgrade, Idaho National Engineering Laboratory (INEL), Idaho

2. Project No.: 86-D-175

9. Purpose, Justification of Need for, and Scope of Project: (continued)

- o Neither the SRT support area nor the Response Vehicle Facility can be located within close proximity of the existing security headquarters because the headquarters is surrounded by nonsecurity- related facilities and aboveground utility lines. The existing security facility does not provide adequate support to the SRT.
- o The existing security headquarters building was constructed in about 1950, with 600 sq. ft added in 1979. Recent safety audits have revealed several National Electrical Code (NEC) electrical wiring deficiencies of the same type that recently caused a fire in a similar building.

For reasons of operational efficiency, this building must be located in the main security complex rather than at the site of the existing building. A major portion of the overall day-to-day INEL security activities will be carried out in this facility, and the same personnel who manage the entire contractor guard force will be used in the main command post in the event of an emergency.

2. SRT Headquarters and Response Vehicle Facility

The training, directing, and support of SRT personnel will be headquartered in this facility. General office areas and helicopter maintenance support areas will also be provided. These functions are currently housed in trailers located next to the existing Helicopter Maintenance Facility. The distance between the buildings in the present arrangement increases response time and hinders effective communications.

An enclosed area for response vehicles will make these vehicles ready for operations on short notice. The current arrangement requires that these vehicles be kept in ready condition to ensure their availability in inclement weather.

3. Other Features

Barrier fencing and alarms will allow detection of intrusion into the INEL Security Complex. The additional access road will allow flexibility of exit paths for response vehicles. Remotely operated vehicle gates will provide vehicle access control capability.

Parking areas for security vehicles will support year-round operations at the INEL by increasing vehicle readiness in inclement weather.

C. Security Badging Facility

Located at the main site entrance, this building will house the personnel, equipment, and public facilities to perform badging and site indoctrination activities in support of INEL Access Control.

1. Title and location of project: INEL security upgrade,
Idaho National Engineering Laboratory (INEL), Idaho

2. Project No.: 86-D-175

9. Purpose, Justification of Need for, and Scope of Project: (continued)

The badging function is mandatory to ensure that only authorized personnel are granted access to the INEL. The existing temporary badging facility, a double-wide trailer, is too small to accommodate all site entry related functions and was never intended to be a permanent facility.

D. Weapons Range

The existing firing range is not adequate to support new weaponry and state-of-the-art training. It has no utilities, and there are no restroom facilities in the area. Consequently, a new upgraded firing range will be required to correct these deficiencies.

Lighting will be added to allow night operation.

The proposed range will include control room areas for range activities to enhance operational safety.

10. Details of Cost Estimate: a/

	Items Cost	Total Cost
a. Engineering, design, inspection and project administration at 21% of construction and equipment cost b/		$ 1,500
b. Construction costs		7,040
(1) Improvements to land--clearing and grading, roads and lighting	$ 1,360	
(2) Buildings--guard station, headquarters building, badging facility/vehicle garage and SRT facility	4,350	
(3) Other structures	0	
(4) Utilities--electrical, water and sewer	1,330	
c. Government-furnished equipment/materials - detection system, alarms, and communication system tie-ins		260
d. Removal cost less salvage		0
e. Contingency at approximately 14% of items a thru d		1,200
Total estimated costs		$ 10,000

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a/ Above estimates are based on conceptual design estimates which are 100% complete.

b/ ED&I costs include a $110,000 estimate for location survey and foundation analysis.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: INEL security upgrade,
Idaho National Engineering Laboratory (INEL), Idaho

2. Project No.: 86-D-175

11. Method of Performance:

Overall responsibility for design and construction will be assigned to the INEL prime contractor administerd by DOE-ID. The INEL contractor will provide technical direction of the design effort. Construction will be accomplished by subcontractors awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Requirements:

	Prior Years	FY 1986	FY 1987	FY 1988	Total
a. Total project cost					
(1) Total facility costs					
(a) Construction line item	$ 0	$ 1,958	$ 7,000	$ 1,042	$10,000
(b) PE&D	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0
(d) Inventories	0	0	0	0	0
Total direct costs	$ 0	$ 1,958	$ 7,000	$ 1,042	$10,000
(2) Other project costs					
(a) R&D necessary to complete construction	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Conceptual design costs	100	0	0	0	100
(c) Other project related costs	0	0	0	0	0
Total other project costs	100	0	0	0	100
Total project costs (items 1 & 2)	$ 100	$ 1,958	$ 7,000	$ 1,042	$10,100

b. Other related annual costs (estimated life of project: 25 years)

(1) Facility operating costs	$ 300
(2) Programmatic operating expenses directly related to the facility	13,000
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	500
(4) Maintenance, repair, GPP or other construction related to programmatic effort in the facility	950
Total related annual costs	$14,750

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of Project: INEL security upgrade,
Idaho National Engineering Laboratory (INEL), Idaho

2. Project No.: 86-D-175

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project cost a/
  (1) Total facility costs - construction line item - no narrative required.
  (2) Other project costs
    (a) Conceptual design costs - prior year expenditures totalling $100,000 for the development of project functional and operational requirements, security enhancement studies, feasibility studies, and conceptual design report completion.

b. Other related annual costs
  (1) Facility operating costs - the major elements comprising the annual operating estimated costs of $300,000 are utility costs, janitorial costs, and minor maintenance tasks.
  (2) Programmatic operating expenses directly related to the facility; $13,000,000 for INEL security guard contract - the INEL security contractor guard force will have direct and primary use of these facilities.
  (3) Capital equipment not related to construction is estimated to be $500,000 and includes vehicles, radios, surveillance equipment and other state-of-the-art security equipment.
  (4) $950,000 worth of maintenance, repair, GPP or other construction related to programmatic effort in the facility.

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a/ It is estimated the facility will be used 25 years for its programmatic use.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular Dollars in Thousands. Narrative in Whole Dollars.)

1. Title and location of project: Seventh calcined solids storage facility, Idaho Chemical Processing Plant, Idaho National Engineering Laboratory, Idaho

2. Project No.: 85-D-157

3. Date A-E work initiated: 2nd Quarter FY 1985

3a. Date physical construction starts: 2nd Quarter FY 1985

4. Date construction ends: 3rd Quarter FY 1989

5. Previous cost estimate: $24,000
Date: 3/85

6. Current cost estimate: $23,300
Less amount for PE&D: 0
Net cost estimate: $23,300
Date: 12/85

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1985	$ 7,000	$ 7,000	$ 7,000	$ 532
1986	14,500	13,319	13,319	3,060
sequestered 1986	0	(1,181)	(1,181)	0
1987	800	800	800	5,470
1988	1,000	2,181	2,181	7,220
1989	0	0	0	6,953
1990	0	0	0	65

8. Brief Physical Description of Project:

This project provides for the construction of the Seventh Calcined Solids Storage Facility (CSSF). The facility will have a total storage capacity of approximately 65,000 cubic feet. The facility will be of sufficient volume to accommodate radioactive liquid waste processing at the Idaho Chemical Processing Plant (ICPP) until approximately FY 1994. The liquid waste produced from the reprocessing of irradiated, highly enriched uranium fuel elements by dissolution and solvent extraction will be converted to a granular solid in the New Waste Calcining Facility (NWCF) and stored in the CSSF.

1. Title and location of project: Seventh calcined solids storage facility,
Idaho Chemical Processing Plant,
Idaho National Engineering Laboratory, Idaho

2. Project No: 85-D-157

8. Brief Physical Description of Project: (continued)

The Seventh CSSF and all associated utilities will be integrated with NWCF. The facility will consist of (1) facilities for primary and secondary containment of the calcined solids, (2) equipment rooms, (3) solids separation equipment, (4) instrumentation and controls, (5) solids transport lines and feed distribution system, (6) primery container vent system, (7) provisions for retrievability, (8) necessary safety features including shielding, (9) decay heat removal system, (10) High Efficiency Particulate Air (HEPA) filtration systems, (11) air radiation monitoring systems, and (12) support facilities such as cathodic protection.

Stainless steel bins will provide the primary containment and a concrete vault will provide the secondary containment for the calcined solids. The vault, which will be largely below ground, will also provide the necessary radiation shielding. It will have several separate enclosed shielded rooms on top. These rooms will contain a solids separator, block valves as part of the transport air system, forced air blowers, HEPA filters, and instrumentation.

After filling, the bins will be vented through the bin vent system. All vented air will be filtered prior to discharge to the atmosphere and the fission product release will be well below the Federal emission standards. The bin vault cooling air will be rough filtered prior to entering the vault and will normally be discharged unfiltered through a stack by either natural or forced convection. This air will be monitored continuously for airborne radioactive particulates. Should the monitor detect radioactive particulates, the control system will automatically start a forced air blower and will automatically divert the cooling air through HEPA filters.

The solids storage facility will include provisions for retrieval of the calcined solids for possible shipment to a geologic repository if this becomes desirable.

9. Purpose, Justification of Need for, and Scope of Project:

Radioactive liquid wastes are produced from the reprocessing of spent reactor fuel at the ICPP. A major portion of this spent fuel is from Navy propulsion reactors. The NWCF converts highly radioactive liquid waste to granular solids by calcination. This CSSF project will provide facilities for safe and economical storage of the radioactive calcined solids. Additional calcined solids storage is required if the NWCF is to continue operation after 2nd quarter FY 1990. In order to meet this programmatic need date and continue reduction in the inventory of the high-level radioactive liquid waste tanks, fabrication of the bins must commence in FY 1985. Fabrication at that time is necessary to guarantee their delivery to meet the construction schedule. A delay in funding would cause the programmatic need date to be missed.

Should the NWCF and ICPP be shut down due to lack of waste storage, the Navy's nuclear program would be adversely affected. Shutdown would also defer recovery of valuable enriched uranium resources and the return of these resources to productive use.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Seventh calcined solids storage facility,
Idaho Chemical Processing Plant,
Idaho National Engineering Laboratary, Idaho

2. Project No.: 85-D-157

9. Purpose, Justification of Need for, and Scope of Project: (continued)

A year delay in funding for the Seventh CSSF would necessitate a shutdown of the NWCF for approximately 9 months. This would mean that approximately 1,260 cubic meters of high-level radioactive liquid waste would not be processed during this time. This increase in liquid waste would not affect the dissolution and extraction processes. The delay, however, would increase the funding requirement for the project by approximately $1.75 to 2 million due to escalation costs. The programmatic scheduling of operating personnel at the NWCF facility would also be affected.

Continued fuel reprocessing at the ICPP without waste calcination would require construction of additional high-level radioactive liquid waste tanks. However, additional liquid waste storage is not acceptable because of economic, safety, and environmental factors. Storage of high-level radioactive waste in the liquid form has a significantly higher risk of leakage of fission products to the environment. Conversion of high-level waste to solids for subsequent storage provides: (a) improved safety, (b) greater assurance of isolation from man's environment, (c) minimal reliance on continued maintenance and surveillance, (d) lower overcosts for waste management, and (e) reduced volume storage requirement (reduction in volume of about 7:1).

Fiscal year 1987 obligations are required for project administration, inspection and construction required to tie in the Seventh CSSF to the NWCF.

10. Details of Cost Estimate: a/ b/

	Item Cost	Total Cost
a. Engineering, design, inspection and project management at 18% of construction costs, item b		$ 3,000
b. Construction costs		16,950
(1) Improvements to land	$ 620	
(2) Building and other structures	9,740	
(3) Utilities	90	
(4) Special facilities	6,500	
c. Contingency @ approximately 20% of items a and b		3,350
Total project costs		$23,300

a/ The above estimates are based on conceptual design that is 100% complete. Advanced conceptual design was completed in FY 1984.

b/ Escalation rate of approximately 6.5% applied based on DOE approved guidelines.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Seventh calcined solids storage facility,
Idaho Chemical Processing Plant,
Idaho National Engineering Laboratory, Idaho

2. Project No.: 85-D-157

11. Method of Performance:

The design work will be accomplished by an outside architect engineer in conjunction with the operating contractor to the extent feasible. Construction and procurement will be accomplished by a fixed-price contract and awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

a. Total project cost	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	Total
(1) Total facility cost									
(a) Construction line item	$ 0	$ 532	$ 3,060	$ 5,470	$ 7,220	$ 6,953	$ 65	$ 0	$ 23,300
(b) PE&D	0	0	0	0	0	0	0	0	0
(c) Expense funded equipment ..	0	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0	0	0
Total facility costs	0	532	3,060	5,470	7,220	6,953	65	0	23,300
(2) Other project costs									
(a) R&D necessary to complete construction	306	0	0	0	0	0	0	0	306
(b) Other project related costs	0	275	364	367	386	202	140	120	1,854
Total other project costs .	306	275	364	367	386	202	140	120	2,160
Total project costs	$ 306	$ 807	$ 3,424	$ 5,837	$ 7,606	$ 7,155	$ 205	$ 120	$ 25,460

b. Other related funding requirements	
(1) Facility operating costs (annual)	$ 35
(2) Programmatic operating expenses* directly related to the facility	0
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	0
(4) GPP or other construction related to programmatic effort in the facility	0
(5) Other costs	0
Total other related annual funding requirements	$ 35

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*Operating costs and programmatic effort for NWCF will not change from that presently budgeted after construction of this facility.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Seventh calcined solids storage facility,
Idaho Chemical Processing Plant,
Idaho National Engineering Laboratory, Idaho

2. Project No.: 85-D-157

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs

(1) Total facility costs

(a) Construction line item - no narrative required.
(b) PE&D - no narrative required.
(c) Expense funded equipment - no narrative required.
(d) Inventories - no narrative required.

(2) Other project costs

(a) R&D necessary to complete construction - funding in this category was required for conceptual design. Total conceptual design costs were $306,000.
(b) Other project related costs - the funding in this category is for project support that is necessary during design and construction and for training and startup costs.

b. Other related annual costs

(1) Facility operating cost - annual operational cost while filling the bins is estimated at $35,000. After the bins have been filled, surveillance and maintenance costs are estimated at $25,000 per year for 5 to 10 years. After this period, annual costs will be negligible.

(2) Programmatic operating expenses related to the facility - operating costs and programmatic effort for NWCF which this facility supports will not change from that presently budgeted when this facility is constructed.

(3) Capital equipment not related to construction but related to the programmatic effort in the facility - no narrative required.

(4) GPP or other construction related to the programmatic effort - no narrative required.

(5) Other costs - no narrative required.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular Dollars in Thousands. Narrative Material in Whole Dollars.)

1. Title and location of project: Central warehouse upgrade, Richland, Washington
2. Project No.: 85-D-158

3. Date A-E work initiated: 2nd Quarter FY 1985
5. Previous cost estimate: None

3a. Date physical construction starts: 2nd Quarter FY 1986
6. Current cost estimate: $13,000
Less amount for PE&D: 0
Net cost estimate: $13,000
Date: 3/84

4. Date construction ends: 2nd Quarter FY 1988

7. Financial Schedule:

Fiscal Year	Authorization	Appropriation	Obligation	Costs
1985	$ 700	$ 700	$ 700	$ 0
1986	5,000	4,744	4,744	2,760
sequestered 1986	0	(256)	(256)	(90)
1987	5,500*	5,500*	5,500*	7,684
1988	1,800	2,056	2,056	2,556

8. Brief Physical Description of Project:

This project will provide a new warehouse facility for the Hanford Site. Included in the project is the construction of approximately 133,000 square feet of warehouse area, approximately 22,500 square feet of office space, and the required site work (parking lots, utilities, and drainage systems) necessary to operate the facility. Where appropriate, support furnishings and moveable equipment will be relocated from the existing building to the new building. Additional equipment as required will be furnished by the project.

As currently planned, the project scope will include the following:

a. Improvements to land

The replacement warehouse will be located on a vacant lot near the existing Central Warehouse Building. Sufficient parking to accommodate building occupants will be provided. The entrances to Route 4 South from the warehouse will be designed consistent with standard plans for highway design.

*Actual FY 1987 BA request is $1,300,000. Assumes $4,200,000 will be provided through reprogramming from Project 83-D-157.

1. Title and location of project: Central warehouse upgrade,
Richland, Washington

2. Project No.: 85-D-158

8. Brief Physical Description of Project: (continued)

b. Buildings

(1) Central warehouse building

The warehouse building will consist of a warehouse/office area on the first floor and an office area on a mezzanine (approximately 22,500 sq. ft.).

(2) Flammable storage building

A building approximately 5,000 square feet will be erected to store flammable materials and liquids.

c. Other structures

(1) Nitrogen bottling facility

The existing storage tank will be relocated by this project. A building of approximately 500 square feet will be erected adjacent to this tank.

d. Special facilities and equipment

Special facilities and equipment currently envisioned include dock levelers, truck scales, pallet rack, dock shelters and cool room for required refrigerated storage.

e. Utilities

Utilities required for the operation of the warehouse will be provided. Utilities currently envisioned include: electrical power, communication system (telephones), fire alarm system, sanitary and fire water supply, sanitary sewer, storm sewer and natural gas supply.

The 1987 appropriation will be used to continue construction.

9. Purpose, Justification of Need for, and Scope of Project:

The primary warehouse and stores facility for the Hanford Site has major structural, electrical and mechanical problems as well as built-in operational inefficiencies.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Central warehouse upgrade, Richland, Washington
2. Project No.: 85-D-156

9. Purpose, Justification of Need for, and Scope of Project: (continued)

Cost analysis indicates that rehabilitation of the structure, heating and insulation system, sprinkler system and lighting would cost approximately 65% of the replacement cost of the building. That expenditure would not resolve the space problems requiring leased space and the use of trailers as offices. Potential operational savings of approximately $230,000 per year would not be realized due to the current warehouse clear heights and configuration.

A history of structural problems, normally roof structural member failures, has been experienced in the existing building. The roof truss system had to be reinforced in 1962. In 1973, there was a partial collapse of the roof. Since the collapse, regular inspections have been made of the entire truss system. Individual truss members have been reinforced or replaced following the inspections. In 1976, in order to limit wall movement, external structural steel wall braces were placed on the south wall and horizontal structural steel trusses were installed along the outer walls. In 1978, approximately 40 roof trusses were replaced or reinforced and all the concrete walls were repaired to limit rebar corrosion.

These repairs and modifications have had limited success in reducing the number of recurring cracks in the walls and pilasters. However, they do not increase the load capacity of the roof. The 1981 inspections of the roof support truss system increased the concerns, and braces and trusses had to be stiffened with the addition of steel plates to the wood braces. The 1983 inspection continued to highlight the structural deficiencies of the building for the following reasons:

- Existing sags in the roof deck allow rain water to pond 4 to 5 inches deep. The weight of the accumulated water could further sag the deck and increase the load on the roof and further exceed the 20 PSF live load capacity of the roof system. Personnel are dispatched to remove standing water and/or snow. However, this cannot always prevent the short term overload of the roof.
- The existing structure does not satisfy the seismic regulations of the Uniform Building Code and would fail under low lateral forces.
- Wood members of the roof structure have deteriorated due to overstress, weathering, and leakage, resulting in unknown actual strength.
- The structure is too flexible to limit wind deflections which result in cracks in the walls and leaks in the built-up roof.

A recent inspection of the electrical system showed signs of deteriorated insulation on existing circuit wiring. The lighting in the storage areas is by incandescent lamps that provide a level of illumination of approximately 5 foot candles (F.C.), which is well below the minimum recommended light level of 20 F.C.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Central warehouse upgrade, Richland, Washington	2. Project No.: 85-D-158

9. Purpose, Justification of Need for, and Scope of Project: (continued)

The existing walls and ceiling also are not insulated, resulting in excessive energy consumption for heating and cooling. During the summer, the warehouse is ventilated with ceiling mounted ventilators that function by air convection, and by opening exterior overhead doors. The building is closed in the evenings and on weekends. The heat during these closed periods causes the temperature to rise in excess of 150 degrees F near the ceiling when the ambient temperature reaches 105 degrees F. The offices are cooled with evaporative coolers and individual air conditioners. The offices within the warehouse exhaust the heat from their air conditioners directly into the warehouse, compounding the ventilation problem.

Building heating is provided by the originally installed oil-fired steam boiler. Recurring malfunctions and general maintenance of the system indicate the need for replacement. The existing system is inefficient compared to current technology. A heating system retrofit has been previously proposed as an energy conservation project.

The sprinkler system has had only limited upgrade since installation almost 30 years ago. The water lines to the sprinkler system are old and corroded and require replacement. Additionally, a recent fire protection survey indicated that the building did not conform to National Fire Code requirements.

Inadequate office and warehouse space has resulted in the need to rent warehouse space and install trailers for office space. Renting permanent space is not cost-effective.

The uncertainty of the load-carrying capacity of the roof under high wind conditions, as well as the known potential to accumulate roof overload during rain and snow storms, is cause for concern for the safety of the occupants and the protection of the material in the building.

10. Details of Cost Estimate: a/	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 7% of construction ...		$ 768
b. Construction costs		10,457
(1) Site work - excavating, grading, drainage paving, parking, fencing, exterior lighting, pedestrian access walks, landscaping, relocation	$ 460	
(2) Buildings - insulation, heating, air conditioning, doors, windows, concrete, finishes	8,800	
(a) Warehouse - 133,000 ft^2 @ \$52/ft^2		
(b) Office - 22,500 ft^2 @ 84/ft^2		

a/ The above estimates are based on conceptual design that is 100% complete.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central warehouse upgrade, Richland, Washington

2. Project No.: 85-D-158

10. Details of Cost Estimate:	Item Cost	Total Cost
(3) Other Structures - nitrogen facility	$ 90	
(4) Utilities - electrical, air, water, and gas service	540	
(5) Special equipment - (such as dock leveler, weigh scales bins and racks)	500	
(6) Warehouse stock and equipment move	67	
c. Contingency at approximately 16% of items a and b		1,775
Total estimated costs		$ 13,000

11. Method of Performance:

Design will be accomplished by an offsite architect-engineer contractor. Construction and procurement will be fixed price awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior yrs.	FY 1985	FY 1986	FY 1987	To Complete	Total
a. Total project costs						
(1) Total facility costs						
(a) Construction line item	$ 0	$ 0	$ 2,760	$ 7,684	$ 2,556	$13,000
Total direct costs	$ 0	$ 0	$ 2,760	$ 7,684	$ 2,556	$13,000
(2) Other project costs						
(a) R&D necessary to complete construction	$ 237	$ 0	$ 0	$ 0	$ 0	$ 237
(b) Other project related costs	0	100	$ 80	70	0	250
Total other project costs	237	100	80	70	0	487
Total project costs (Item 1 & 2)	$ 237	$ 100	$ 2,840	$ 7,754	$ 2,556	$13,487

b. Other related annual costs (estimated life of project: 25 years)	
(1) Facility operating costs	$ 50*
(2) Programmatic operating expenses directly related to the facility	0
Total related annual costs	$ 50

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*This compares with $184,000 current facility operating costs.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central warehouse upgrade,
Richland, Washington

2. Project No.: 85-D-158

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project costs
    (1) Total facility
        (a) Construction line item - no narrative required.

    (2) Other project costs
        (a) R&D necessary to complete construction - the conceptual design effort for this project is $237,000.
        (b) Other project related costs associated with project support and management, and design review are estimated to be $250,000.

b. Other related annual costs - it is estimated the facility will be used 25 years for its programmatic purpose.

    (1) Facility operating costs - after installation, there will be minor operating costs involving maintenance and repair activities estimated to be $50,000.

    (2) Programmatic operating expenses directly related to the facility - the facility will have an annual operating budget of approximately $8,400,000, which is liquidated to other projects and contractors through material overhead.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: New waste transfer facilities,
Savannah River, South Carolina

2. Project No.: 85-D-139

3. Date A-E work initiated: 1st Quarter FY 1985

3a. Date physical construction starts: 1st Quarter FY 1986

4. Date construction ends: 3rd Quarter FY 1989

5. Previous cost estimate: $47,000
Date: 1/85

6. Current cost estimate: $41,000 a/
Date: 1/86

7. Financial Schedule:

	Fiscal Year	Authorization	Appropriations	Obligations	Costs
	1985	$ 11,000	$ 11,000	$ 11,000	$ 7,640
	1986	9,000	8,118	8,118	9,260
sequestered	1986	0	(882)	(882)	(540)
	1987	8,200	8,200	8,200	9,132
	1988	12,800	13,682	13,682	11,240
	1989	0	0	0	3,700

8. Brief Physical Description of Project:

This project will replace an existing obsolete diversion box/pump pit waste transfer facility with one of current design. This facility is designed to transfer waste between the type III tanks in the east and west H-Area waste tank farms and between F and H Areas. This facility has the capability included in the design to transfer and receive waste from the Defense Waste Processing Facility (DWPF). This project will include all required transfer piping and equipment, instrumentation and controls to operate this system safely and within current operating technical standards.

This facility will consist of a new diversion box with jumpers and service piping. The diversion box will provide 11 transfer lines to existing facilities and eight lines for future long-term waste programs. The lines will be stainless steel core and carbon steel jacket, both designed for long-stress cycle life. In conjunction with this diversion box, four pump pits similar to those provided on project 79-7-K will be constructed. These pump pits will be equipped with pump tanks, separable overhung shaft pumps, emergency transfer jets, sump jets, agitators, cooling coils and associated pump pit instrumentation.

a/ Reflects reduction for escalation and contingency plus addition of new scope to replace obsolete evaporator feed system.

1. Title and location of project: New waste transfer facilities,
Savannah River, South Carolina

2. Project No.: 85-D-159

8. Brief Physical Description of Project: (continued)

The pump pits and diversion box will be of current design with all stainless steel liner and underliner leak detection capabilities. Service tie-ins include steam, electrical, emergency power, plant air, instrument air, breathing air, cooling water, flush water, and domestic water. All gang valves will be motorized mechanical gang valves with remote and local operations capabilities. Alarms and controls for this diversion box and pump pit complex will be in a control room provided by an earlier project. A ventilation system conforming to current design standards will be provided. Area lighting and communications will also be provided.

The new complex will be enclosed in a metal building with a remotely operated bridge crane in the building. This will permit repair work and equipment changes to be performed during inclement weather, thus minimizing the amount of time the complex will be out of service, and hence, potential impacts on production and waste management operations.

The new transfer complex will comply with all applicable criteria for a nuclear facility and be designed to reduce radiation exposure to operating and maintenance personnel to levels as low as reasonably achievable (ALARA). Design and components will be such that maintenance is minimal.

Also included in this project for FY 1987, will be the replacement of an obsolete evaporator feed system using a type II tank in H-Area with a new system using a high-integrity type III tank. This will provide:

- Feed and vent lines with secondary containment to the type III tank
- Vent line cleanout ports with drain lines
- Leak detection boxes with drain lines
- Installation of a feed pump in the type III tank
- Service tie-ins
- One spare feed pump
- Retirement of the existing feed system

9. Purpose, Justification of Need for, and Scope of Project:

The purpose of this project is to replace an existing diversion box/pump pit waste transfer facility and to replace an existing waste evaporator feed system.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: New waste transfer facilities, Savannah River, South Carolina — 2. Project No.: 85-D-159

9. Purpose, Justification of Need for, and Scope of Project: (continued)

A new waste transfer facility will be required in FY 1989 to continue H-Area tank farm operations after type I, II, and IV waste tanks are retired from service and to interface with the DWPF. The new facility is justified for two reasons:

- Replaces existing obsolete waste transfer complex. A 25-year-old waste transfer complex connects two sets of type III tanks in H-Area and ties into F-Area transfer lines.

  The existing complex lacks full height stainless steel cell liners, jacketed transfer line wall penetrations and full leak detection capability which are included in current design criteria for secondary containment of radioactive waste. Transfer lines into and out of the existing complex have only a concrete encasement and catch tank for secondary containment. All other transfer lines located in this concrete encasement will be abandoned upon retirement of type I tanks in H-Area.

  The existing ventilation system does not meet current design criteria for preventing an atmospheric release of radioactivity. Also, the pump pits are not designed to accept the new separable overhung shaft pump which reduces radiation exposure to personnel.

  For these reasons, a replacement transfer facility is required. To reduce radiation exposure and contamination potential associated with such facilities, an enclosure and overhead crane in the new facilities will be provided. The enclosure will also permit work in the complex during inclement weather, thus minimizing the amount of time the complex will be out of service, and avoiding potential impacts on production and waste management operations.

- Expands H-Area transfer facilities for DWPF. The DWPF will create new requirements, for waste transfer facilities, which will be met by this project. In addition to increased waste transfers from F to H Area, transfers of large amounts of contaminated waste from DWPF to H-Area and waste from H-Area to DWPF will be made daily. The new Waste Transfer Facility must be operating in time to interface with DWPF in FY 1989, because the existing transfer facility does not have enough nozzle penetrations to accommodate these new lines.

The new evaporator feed system is justified for the following reasons:

- The existing feed tank is the only type I, II, or IV waste tank in critical-need service. Two cracks have been found in the tank. The most recent crack, found in 1980, restricts the tank fill limit.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: New waste transfer facilities,
Savannah River, South Carolina

2. Project No.: 85-D-159

9. Purpose, Justification of Need for, and Scope of Project: (continued)

- Retirement of the existing feed tank is required as part of the waste transfer program. Continued use of the type II tank as an evaporator feed tank will delay the waste transfer schedule by 3 years.

- The top of the existing feed tank is a high radiation area due to a recent waste spill. The new evaporator feed system will reduce H-Area waste operations radiation exposure by five percent.

10. Details of Cost Estimate:

		Item Cost	Total Cost
a. Engineering, design and inspection at approximately 27% of construction costs, item B.			$ 7,555
b. Construction costs.			28,550
(1) Improvements to land.		$ 565	
(a) Excavation, backfill and finish grading	210		
(b) Roads, parking lot and sidewalk	270		
(c) Lighting.	45		
(d) Fence and gates	40		
(2) Buildings		1,740	
(a) Diversion box and pump pit building, 10,250 sq ft	1,500		
(b) Pump pit ventilation building, 670 sq ft.	130		
(c) Process ventilation building, 600 sq ft	110		
(3) Other structures.		6,390	
(a) Concrete diversion box and pump pit cells with stainless steel liner	5,765		
(b) Pit dewatering.	315		
(c) Pit sheet piling.	310		
(4) Special facilities.		17,135	
(a) Process equipment	3,805		
(b) Power and H&V equipment	280		
(c) Ductwork.	220		
(d) Electrical.	825		
(e) Instruments	960		
(f) Process piping.	5,790		
(g) Process jumpers	985		

1. Title and location of project: New waste transfer facilities, Savannah River, South Carolina

2. Project No.: 85-D-159

10. Details of Cost Estimate: (continued)

		Item Cost	Total Cost
(h) Waste transfer pipe	4,175		
(i) Spare equipment	95		
(5) Utilities		2,720	
(a) Railroad relocation	740		
(b) Storm sewers	255		
(c) Fire protection	40		
(d) Outside service piping	1,655		
(e) Communications	30		
c. Standard equipment			25
(1) Health protection equipment		25	
d. Removal costs/maintaining production			170
Subtotal			36,300
e. Contingency at approximately 11% of above costs			4,200
f. Allowance for design and construction liaison, checkout and acceptance			500
Total project cost			$ 41,000

1/ Engineering design (item 10a) and AED allowance (item 10f) include a limited amount of inspection costs for special equipment. The majority of the inspection costs are reflected in construction costs (item 10b).

2/ Conceptual design is 100% complete.

11. Method of Performance:

Design will be performed by the operating contractor. Construction and procurement will be accomplished by the operating contractor utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: New waste transfer facilities, Savannah River, South Carolina

2. Project No.: 85-D-159

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	Total
a. Total facility costs							
(1) Total facility costs							
(a) Construction line item............	$ 0	$ 7,668	$ 9,260	$ 9,132	$11,240	$ 3,700	$41,000
(b) PE&D..............................	0	0	0	0	0	0	0
(c) Expense funded equipment...........	0	0	0	0	0	0	0
(d) Inventories........................	0	0	0	0	0	0	0
Total facility costs..................	0	7,668	9,260	9,132	11,240	3,700	41,000
(2) Other projects costs							
(a) R&D necessary to complete construction......................	0	0	0	0	0	0	0
(b) Conceptual design..................	625	50	0	0	0	0	675
(c) Other project related cost.........	300	0	0	0	0	0	300
Total other project funding........	925	50	0	0	0	0	975
Total project funding..............	$ 925	$ 7,718	$ 9,260	$ 9,132	$11,240	$ 3,700	$41,975

b\. Total related funding requirement (estimated life of facility: 40 years) (FY 1985 dollars)

	Annual Cost
(1) Facility operating costs...	$ 100
(2) Programmatic operating expense directly related to the facility...........................	0
(3) Capital equipment not related to construction but related to the programmatic effort in the facility...	0
(4) GPP or other construction related to programmatic effort in the facility.................	0
Total other related annual funding requirements..	$ 100

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
  (1) Total facility costs
    (a) Construction line item - includes costs for the construction project.
    (b) PE&D - none required.
    (c) Expense funded equipment - none required.
    (d) Inventories - none are needed for the proposed facilities.

1. Title and location of project: New waste transfer facilities, Savannah River, South Carolina
2. Project No.: 85-D-159

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements: (continued)

(2) Other project costs
  (a) R&D not required.
  (b) Conceptual design and engineering studies totalling $675,000 includes preparation of a cost estimate for project authorization and improving equipment design.
  (c) Other project related costs - plant liaison prior to authorization totals $300,000.

b. Total related funding requirements
  (1) Facility operating costs - includes incremental costs for utilities and supplies of $100,000.
  (2) Programmatic operating expenses directly related to the facility - none.
  (3) Capital equipment not related to construction but related to the programmatic effort in the facility - none.
  (4) GPP or other construction related to programmatic effort - none.
  (5) Other costs - none.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular Dollars in Thousands. Narrative Material in Whole Dollars.)

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1. Title and location of project: Test reactor area security system upgrade, Idaho National Engineering Laboratory (INEL)

2. Project No.: 85-D-108

3. Date A-E work initiated: 2nd Quarter FY 1985

3a. Date physical construction starts: 3rd Quarter FY 1985

4. Date construction ends: 1st Quarter FY 1988

5. Previous cost estimate: $7,000
Less amount for PE&D: 0
Net estimate: $7,000
Date: 1/85

6. Current cost estimate: $7,000
Less amount for PE&D: 0
Net estimate: $7,000
Date: 1/86

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7. **Financial Schedule:**

	Fiscal Year	Authorization	Appropriation	Obligations	Costs
	1985	$ 2,000	$ 2,000	$ 2,000	$ 350
	1986	2,250	2,250	2,250	2,270
sequestered	1986	0	(47)	(47)	0
	1987	2,750	2,750	2,750	2,380
	1988	0	47	47	[illegible]

8. **Brief Physical Description of Project:**

The TRA Security Upgrade project includes four subprojects: 1) TRA Perimeter Protection, 2) TRA Access Control, 3) Nuclear Materials Inspection and Storage (NMIS) Facility Upgrade, and 4) Security Alarm, Control Station and Computer Systems.

Subproject I - TRA Perimeter Protection

a. TRA Perimeter Fencing

The existing TRA perimeter fence will be removed and replaced with a double fence enclosing a monitored sterile zone. The inner fence line will be comprised of a continuous line of reinforced concrete median barriers. The inner fence line will deter intrusion of unauthorized personnel and of wheeled vehicles into TRA and the outer fence will prevent the intrusion of animals or wind-blown debris into the sterile zone.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Test reactor area security system upgrade, Idaho National Engineering Laboratory 2. Project No.: 85-D-160

4. Brief Physical Description of Project (continued)

b. Vehicle Entry (VE)

The Vehicle Entry (VE) will control vehicles entry and egress through the TRA perimeter, and provide for positive containment during vehicle inspection and search operations. Monitoring equipment will be incorporated to survey vehicles for contraband, explosives, or any unauthorized items. Motor-operated personnel and vehicle barriers will be incorporated for positive control. Access control of vehicle drivers will also be provided for through the VE.

c. Perimeter Intrusion Detection System

Independent intrusion detection systems will be installed in the sterile zone. Signals from each zone will be multiplexed and transmitted to the Security Alarm and Control System (SACS) where they will be monitored. Perimeter alarm assessment will be provided by standard fast-scan video cameras; one for each alarm zone. The cameras will be compact, self-contained units. Operation of the cameras will be fully automatic and automatic sensitivity controls will adjust for the anticipated brightness levels. The cameras will be protected from, and operate in extremely low or high temperatures, high winds, rain, snow, and other severe weather conditions. The perimeter lighting system will be positioned to project light over the sterile zone. In addition, lighting will be provided to assure Closed Circuit Television (CCTV) surveillance of both the front and rear of the Access Control Facility (ACF).

An emergency vehicle access control point will be constructed in the vicinity of the existing emergency evacuation gate on the east perimeter to permit rapid passage of emergency vehicles (fire engines, ambulances, etc.) into TRA. Control of the fence gate and delta barrier will be from the SACS.

Subproject II - TRA Access Control

a. TRA Access Control Facility (ACF)

The TRA ACF will be a one story building and the exterior structure will be of precast, reinforced concrete construction. The ACF will serve as the access control point for all personnel entering or leaving the TRA area with the exception of vehicle drivers. The ACF will also serve as the reception area for all visitors.

b. Access Control

The Access Control (AC) will be a hardended room with the access and egress granted only be means of card readers. The card reader controlled access doors will be glass revolving, 4-wing doors which will automatically lock in response to a contraband detection system alarm (in the affected lane), or from a manual signal transmitted from the Access Control Systems (ACS) or guard stationed in the access control lane.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Test reactor area security system upgrade, Idaho National Engineering Laboratory

2. Project No.: 85-D-160

8. Brief Physical Description of Project: (continued)

c. Computer Terminal/Printer

A computer terminal linked to th SACS computers will be provided at a remote location to enter visitor/pass data into personnel accountability records. A high speed printer will be installed in the ACS to receive printouts of area occupancy lists following evacuation or when required.

Subproject III - Nuclear Materials Inspection and Storage (NMIS) Facility Upgrade

The NMIS Facility Upgrade will include a new storage vault and an intrusion detection system. A portal will be incorporated which will require satisfactory multi-credential identification to gain access to the building. Within the storage vault area, modifications will be made to the storage structures to prevent the unauthorized removal of Category I and IA amounts of special nuclear material.

Additional physical restraints will be placed over the cores of the ATR Critical Facility, which will increase time delay for fuel removal. These facilities will be equipped with occupancy detection and alarm systems for use when the facilities are unmanned.

Subproject IV - Security Alarm and Control Station (SACS) and Computer Systems

The SACS and its computer system will be located in an adjacent building. A large hardened room in this building will be modified for this installation. All doors into the vestibule, SACS, and Computer Room are hardened, with card reader entry control into the vestibule plus SACS operator confirmation to enter the SACS or the SACS computer room.

The FY 1987 funding budget authority (BA) of $2,750,000 will be used to complete subproject construction, equipment procurements and installations, and project management and inspection functions.

9. Purpose, Justification of Need for, and Scope of Project:

The upgrade proposals presented in this project are the result of an in-depth evaluation of the security measures, methods and practices currently in use at the TRA. This evaluation was performed by the Sandia National Laboratory Safeguards Engineering Division, Albuquerque, New Mexico.

The TRA security system is required to protect the ATR, NMIS, and other facilities from damage, destruction and theft. The replacement value of the ATR is currently estimated in excess of $225 million for structures and equipment. An assessment is not available for impact to the defense-related programs of which the ATR serves as an irreplaceable link.

1. Title and location of project: Test reactor area security system upgrade, Idaho National Engineering Laboratory

2. Project No.: 85-D-160

9. Purpose, Justification of Need for, and Scope of Project: (continued)

The TRA is operated in support of reactor safety testing and experimental programs as well as programs related to national defense goals. The TRA supports the operating of the ATR, various Physics Division programs, the Thermal Fuel Behavior Program, Power Burst Facility (PBF), Division Test Train Assembly Facility, and the NMIS Facility. PBF is currently conducting a series of severe fuel damage experiments for the Nuclear Regulatory Commission. The nuclear test train assemblies used in these experiments are assembled at TRA.

Approval of this project proposal will bring the TRA into compliance with the current scope and policies of Department of Energy (DOE) Orders 5632.1, Physical Protection of Classified Matter, and 5632.2, Physical Protection of Special Nuclear Materials (SNM). These orders establish policies for personnel credentials, accessibility based upon the two-man-rule to sensitive areas and materials, restriction of vehicle usage, and the application of alarm systems.

Subproject I - ATR Perimeter Protection

The present perimeter security fence around the TRA has no intrusion detection system in place to provide early warning for unauthorized entry into the TRA either by personnel crossing the fence line or forced vehicle entry through the fence. Alternate manpower-intensive measures are currently employed. A double security fence forming an isolating zone around the perimeter and use of diverse intruder detection systems will improve delay sufficient to permit guard assessment and response.

The new vehicle entry will improve examination capability and vehicle access control within the Test Reactor Area.

Subproject II - TRA Access Control

At present, the guardhouse in use is of insufficient size to properly control access to the TRA. Present personnel monitoring and access control equipment add to the congestion of an already undersized building.

The present guardhouse is of piecemeal construction as the result of 30 years of changes to the building structure. Although the present heating, air conditioning and ventilating systems are marginal for the equipment already in use, additional demands for electrical power, heating and air conditioning are projected. Building hardness is incomplete and only a few specified areas have been upgraded to the newly required building hardness requirements.

No briefing room for area orientation currently exists. Area orientations are conducted using video tape equipment in the main access area, which adds to the existing congestion. A new briefing room would also minimize entry to the TRA by occasional visitors, by providing meeting space when access to the TRA is not essential.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Test reactor area security system upgrade, Idaho National Engineering Laboratory

2. Project No.: 85-D-160

9. Purpose, Justification of Need for, and Scope of Project: (continued)

Subproject III - NMIS Facility Upgrade

A second facility at TRA which will undergo security improvements is the Nuclear Materials Inspection and Storage Facility (NMIS). The NMIS building is used in support of all INEL projects which require the inspection and/or storage of nuclear materials in Categories IA and II. Currently, this includes the ATR, the ATR Critical Facility and PBF. Nuclear fuels were also being stored in the facility for the Engineering Test Reactor (ETR) and the General Electrical Test Reactor (GETR).

The NMIS building is used as the central storage location for SNM used in many projects including those in support of national defense goals. This centralized location for SNM makes the NMIS a realistic target for theft.

Subproject IV - Security Alarm Control Station and Computer System

The present security alarm and monitoring system is located in very congested quarters. The present location and system has neither the physical space nor system expansion capabilities to satisfy the enhanced security accessment and control requirements of TRA. The existing structure has been previously hardened but is no longer adequate to meet current security requirements.

10. Details of Cost Estimate: a/

	Item Cost	Total Cost
a. Engineering, design, inspection and project management at 23% of item b ...	$	$ 1,204
b. Construction costs		4,610
(1) Improvements to land	1,310	
(2) Building and structures	940	
(3) Utilities	340	
(4) Equipment	920	
(5) Demolition and removal	40	
(6) Special equipment (government furnished)	1,060	
c. Contingency at 20% of items a and b		1,186
Total Project Cost		7,000

a/ The above estimates are based on conceptual design estimates which are 100% complete.

EDI or contingency may be higher than anticipated because of the technical nature of some subproject designs and unforeseen demolition and removal.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Test reactor area security system upgrade, Idaho National Engineering Laboratory

2. Project No.: 85-D-160

11. Method of Performance:

Overall responsibilities for design and construction will be assigned to the INEL prime contractor administered by DOE-ID. The INEL contractor will provide technical direction of the design effort. Construction will be accomplished by subcontractors awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project costs						
(1) Total facility funding						
(a) Construction line item	$ 0	$ 350	$ 2,276	$ 2,388	$ 1,986	$ 7,000
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total direct costs	$ 0	$ 350	$ 2,276	$ 2,388	$ 1,986	$ 7,000
(2) Other project costs						
(a) R&D necessary to complete construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Conceptual design costs	60	0	0	0	0	60
(c) Other project related costs	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Total other project costs	60	0	0	0	0	60
Total project costs (items 1 & 2) .	$ 60	$ 350	$ 2,276	$ 2,388	$ 1,986	$ 7,060

b. Other related annual costs (estimated life of project: 20 years)

(1) Facility maintenance and operating costs	$ 2,000
(2) Programmatic operating expenses directly related to the facility	0
(3) Capital equipment not related to construction but related to the programmatic effort	0
(4) GPP or other construction related to programmatic effort	0
Total related annual costs	$ 2,000

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Test reactor area security system upgrade, Idaho National Engineering Laboratory (INEL)

2. Project No.: 85-D-160

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs - construction line item - no narrative required.

b. Other related annual costs - it is estimated that the facility will be used for 20 years for its programmatic purpose.

(1) Facility operating costs - these costs include security force, personnel demands, building energy and maintenance support, and maintaining equipment; are estimated to be $2,000,000.

(2) Programmatic operating expense directly related to the facility - none.

(3) Capital equipment not related to construction but related to programmatic effort - none.

(4) GPP or other construction related to programmatic - none.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular Dollars in Thousands. Narrative Material in Whole Dollars.)

1. Title and location of project: Waste Handling and Isolation facilities, Richland, Washington	2. Project No.: 82-D-[illegible]
3. Date A-E work initiated: 4th Quarter FY 1979	5. Previous cost estimate: $36,400 Date: 2/85
3a. Date physical construction starts: 2nd Quarter FY 1982	6. Current cost estimate: $38,000 Less amount for PE&D: 1,730 Net cost estimate: $36,270 Date: 1/86
4. Date construction ends: 4th Quarter FY 1989	

7. Financial Schedule:

	Fiscal year	Authorization	Appropriations	Obligations	Costs
	1982	$ 24,450	$ 12,000	$ 12,000	$ 828
	1983	0	7,000	7,000	4,528
	1984	0	3,570	3,570	5,419
	1985	0	9,700	9,700	11,801
	1986	0	2,000	2,000	5,233
sequestered	1986	0	(111)	(111)	(87)
	1987	0	2,000	2,000	5,167
	1988	0	111	111	1,000
	1989	0	0	0	826

8. Brief Physical Description of Project:

This project will provide the facilities, processes and/or structures for the isolation of single-shell waste storage tanks, surveillance instrumentation to monitor waste storage tanks, and measures to minimize the potential for release of radioactive materials to the environment.

The following are examples of the facilities, processes and/or structures provided by the capital funds for this project:

a. All old single-shell waste tanks will be isolated from the active waste handling system. Piping will be disconnected and capped; and risers and ventilation systems will be sealed. This will prevent the inadvertent addition of liquids into the tanks after liquids have been removed during the stabilization effort.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Waste Handling and Isolation Facilities, Richland, Washington | 2. Project No. 82-H-713

6. Brief Physical Description of Project: (continued)

b. Sealing of single-shell auxiliary waste storage tanks, vaults, pits, related containment vessels, pumping equipment, dome risers, pit drains, etc., against unplanned addition of liquids by installation of at least one positive physical barrier on dome risers, water, steam, air, process lines, etc. If a structure cannot be secured by severing and sealing lines, a suitable closure capable of sealing and preventing unauthorized entry or removal will be installed. Methods of isolation will allow future access, if required.

c. Provision of surveillance instrumentation to monitor single-shell waste storage tanks for pressure, the presence of combustible gas, the measurement of solid and liquid contents and to indicate movement or structural degradation of waste storage tanks, tank walls, and domes. Additional dry wells will also be provided on the tank periphery where required. Fixed and mobile instrumentation will be utilized to monitor and record the parameters for tank surveillance. Bench marks will be affixed to the tank domes for survey measurement of dome differential. Thermocouple trees will be installed in the interior of larger high temperature single-shell tanks. A riser on each tank will be modified to allow connection of a portable exhaust system to preclude releases to the environment when a tank flange is removed for inspection of instrumentation.

d. Upgrading of the 200 Areas cathodic protection system to protect the buried carbon and stainless steel pipelines and catch tanks against galvanic corrosion.

e. Expansion of the Computerized Automatic Surveillance System (CASS) by connecting remote alarms to CASS substations. This will centralize surveillance for the 200 Areas in the 2750-E Waste Management Surveillance and Operations Facility.

f. Provide necessary transportable grout equipment and facilities and support materials handling equipment to immobilize radioactive liquid waste.

g. Provision and/or modification of existing facilities, processes and/or structures, for improved handling and stabilization of waste which is either being concentrated and stored in existing Hanford facilities or in adjoining areas. Such efforts would minimize the amount of waste which must be stored and stabilized, thus reducing the potential for releases to the environment. Through a combination of process improvements and new processes, wastes would be fixed for burial or lower cost storage.

The FY 1987 funding will allow for completion of construction.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington

2. Project No.: 82-N-103

9. Purpose, Justification of Need for, and Scope of Project:

Completion of the removal of freestanding liquid from the 149 old single-shell tanks at Hanford was accomplished in November 1980. Removal of the remaining pumpable liquid is scheduled to be completed in FY 1989. The primary purpose of this project is to maintain the old single-shell tanks in a safe, stable condition by providing for their long-term isolation, surveillance, and corrosion protection. In addition, the project includes a transportable grout facility to convert liquid low-level waste to a form suitable for shallow-land burial. This material is now stored in high-level waste tanks.

This isolation effort will place the single-shell waste storage tanks, related auxiliary facilities, and systems in a mode which will minimize the possibility of intrusion of liquids into these systems, thereby preventing the migration of radioactive materials from these tanks and/or containments. The surveillance instrumentation will provide increased monitoring capability for large single-shell waste storage tanks until long-term disposal options are implemented.

Upgrading the 200 Areas cathodic protection system will provide protection against galvanic corrosion of buried pipelines, catch tanks and other equipment.

The transportable grout facility will convert liquid low-level waste to a solid for shallow-land burial. Considering the cost of high-level waste tanks, where the waste is now stored, the subproject will have a payback of about two years. In addition, subject to the National Environmental Policy Act (NEPA) process, it may be possible that the contents of several existing high-level waste tanks can be reclassified as low-level waste and, therefore, could be processed through the grout facility, freeing up additional space for high-level waste operations at Hanford.

This project will provide such items as: (a) the facilities for the isolation of Hanford waste storage tank farms, (b) additional surveillance instrumentation for single-shell waste storage tanks and related systems, (c) additional protection against galvanic corrosion for buried pipelines and single-shell catch tanks, (d) a portable grout facility to process liquid low-level waste, and (e) additonal protection against gaseous or particulate releases from waste transfer on storage facilities.

10. Details of Cost Estimate: a/

	Item Cost	Total Cost
a. Title II design services at 7% of construction costs, item c		$ 1,700
b. Title III services at 8% of construction costs, item c		1,900
c. Construction costs		24,650
(1) Construction will include modification of existing risers to incorporate a valve assembly that connects to breathing filters on the isolated tanks	$ 500	

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a/ The above estimates are based on conceptual design and feasibility studies that are 87% complete.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington	2. Project No.: 82-N-103

10. Details of Cost Estimate: (continued)

	Item Cost	Total Cost
(2) Special facilities including specialized pumps, piping, instrumentation, filter systems, job cranes, dry wells, caissions, and barriers	24,150	
d. Contingency @ approximately 22% of sums of items a - c		$ 6,200
Total estimated costs		$ 34,450

11. Method of Performance:

Title II design services will be performed by a negotiated architect/engineer contract. Title III services will be accomplished by the Cost-Plus-Award-Fee (CPAF) architect/engineering contractor. Construction and procurement will be accomplished by the onsite CPAF construction services contractor or fixed-price contracts and subcontracts awarded competetively.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior yrs.	FY 1983	FY 1984	FY 1985	FY 1986	Complete	Total
a. Total project costs							
(1) Total facility costs							
(a) Construction line item	$ 826	$ 4,528	$ 5,419	$11,851	$ 5,233	$ 6,593	$34,450
(b) PE&D	1,550	0	0	0	0	0	1,550
Total facility costs	2,376	4,528	5,419	11,851	5,233	6,593	36,000
(2) Other project costs							
(a) R&D necessary to complete construction	800	0	0	0	0	0	800
(b) Other project related costs .	350	300	250	150	50	200	1,300
Total other project costs ...	1,150	300	250	150	50	200	2,100
Total project costs (items 1 & 2)	$ 3,526	$ 4,828	$ 5,669	$12,001	$ 5,283	$ 6,793	$38,100

b. Other related annual costs	
(1) Annual facility operating cost	$ 600
(2) Programmatic operating expenses directly related to the facility	2,700
(3) Capital equipment not related to construction but related to the operating effort in the facility	100
Total related annual costs	$ 3,400

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington	2. Project No.: 82-N-103

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
  (1) Total facility costs
    (a) Construction line item - no narrative required.
    (b) PE&D - no narrative required.

  (2) Other project costs
    (a) R&D necessary to complete construction

The estimated conceptual design cost for this project is $950,000.

    (b) Other project costs

These costs associated with project support and management activities are estimated to be $1,300,000.

b. Other related annual costs
  (1) Facility operating costs including manpower, energy, maintenance and shop supplies for operation of facilities and processes are estimated to be $600,000.

  (2) Programmatic operating expenses directly related to the facility, estimated to be $2,700,000, represent approximately one-half of the waste management operating costs for the Hanford waste management systems of which these facilities will be a part.

  (3) Capital equipment not related to construction but related to operating effort in the facility, including a special purpose vehicle for transport of solidified waste, are estimated to be $100,000.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Defense Waste and Byproducts Management

(Tabular Dollars in Thousands. Narrative Material in Whole Dollars.)

1. Title and location of project: Defense waste processing facility,
Savannah River, South Carolina

2. Project No. 81-T-105

3. Date A-E work initiated: 4th Quarter FY 1979

3a. Date physical construction starts: 1st Quarter FY 1984

4. Date construction ends: 4th Quarter FY 1989 a/

5. Previous cost estimate:	$ 886,965
Less amount for PE&D:	16,965
Net cost estimate:	$ 870,000
Date: 4/84	
6. Current cost estimate:	$ 886,965
Less amount for PE&D:	16,965
Net cost estimate:	$ 870,000 b/
Date: 4/85	

7. Financial Schedule:

Fiscal year	Authorization	Appropriations	Obligations	Costs
1981 c/	$ 10,000	$ 0	$ 0	$ 0
1982	20,000	20,000	20,000	12,655
1983	30,000	40,000	40,000	35,511
1984	142,000	142,000	142,000	79,437
1985 d/	227,467	227,467	227,467	155,295
1986 e/	165,000	155,400	155,400	201,800
sequestered 1986	0	(8,000)	(8,000)	(6,200)
1987	135,000	135,000	135,000	235,100
1988	140,533	150,133	150,133	114,100
1989	0	0	0	36,102

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a/ Reflects 3 months delay because of FY 1986 reduction.
b/ Impact of schedule delay on cost estimate is being assessed; delay could increase costs.
c/ Funding was subsequently appropriated as PE&D.
d/ Reflects reduction of $1,733,000 for reprogramming of funds for Washington State sales taxes; and $1,300,000 for management initiative savings. The funding will be restored in FY 1988.
e/ Tentative allocation of $1,600,000 general reduction pending review of other projects.

1. Title and location of project: Defense waste processing facility, Savannah River, South Carolina

2. Project No. 81-T-105

8. Brief Physical Description of Project:

The Defense Waste Processing Facility (DWPF) will solidify defense high-level radioactive waste at the Savannah River Plant (SRP) for temporary on-site storage, transportation to, and disposal in a Federal repository. This project will provide facilities to immobilize the high-level waste in borosilicate glass in steel canisters. The canisters will be stored on the SRP site until a Federal repository is available. Decontaminated salt will be solidified as a monolith with low permeability for disposal on-site as a low-level radioactive waste. The radioactive cesium separated from the salt will be combined with the sludge waste for vitrification. Alternately, the separated cesium could be made available for recovery and purification for beneficial uses. The DWPF will begin operation in early FY 1990 and will process the waste backlog inventory over approximately 10-15 years. The facility will be built near the H Chemical Separations Area and will include the waste processing facilities, waste storage vault, and power, service and other support facilities.

The main process building will be seismic and tornado resistant and will include remotely operated and maintained process cells containing process vessels and equipment which will be interconnected through systems of piping. The concrete walls will provide shielding against the highly radioactive waste solutions and solids. Cold feed chemicals and service systems, e.g., instrument connections, cooling water, steam, electrical power, etc., will be provided from adjacent areas behind the shielding walls to protect operating personnel. Ventilation air will be passed through a filter before final monitoring and discharge to the atmosphere. Also provided will be maintenance shops and areas, control rooms and similar service locations. New facilities and supporting services such as electrical substations, water wells, sanitary sewer systems, roads, shops and support facilities will be provided as needed.

This project will provide safe storage for 5 years' production of the radioactive waste glass in canisters. The storage facility will require minimum surveillance and attention. It is intended to store the immobilized waste on site until a Federal waste repository is available for disposal. The waste form and storage will be compatible with transportation to, and storage in, a waste repository. If the waste repository is not available on a schedule to meet DWPF production output, additional storage capacity can be added.

9. Purpose, Justification of Need for, and Scope of Project:

The DWPF will immobilize defense high-level radioactive waste at the SRP for disposal in a geologic repository.

Defense high-level radioactive waste results from processing irradiated reactor fuel at the SRP to produce nuclear materials for national defense. Approximately 30 million gallons of high-level waste (HLW) have accumulated from past production operations, and an additional five to ten million gallons will be generated through the year 2000. The waste is stored in large underground tanks which have a limited life and must be replaced periodically. This interim storage mode requires active maintenance, surveillance, and other operations to minimize releases of radioactive material to the environment. The DWPF will immobilize waste as a stable solid. This immobilization, and confinement in a geologic

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Defense waste processing facility, Savannah River, South Carolina	2. Project No. 81-T-105

9. Purpose, Justification of Need for, and Scope of Project: (Continued)

repository of the hazardous radionuclides, will ensure the long-term isolation of the waste from the environment with minimal maintenance and surveillance.

This project will provide facilities which will perform the following operations:

a. Transfer the treated HLW from waste storage tanks to feed tanks in the main processing building.
b. Process the waste to produce canisters of waste immobilized in borosilicate glass.
c. Store the filled containers on site pending transfer to a waste repository.
d. Solidify decontaminated salt for on-site disposal as low-level waste (LLW).

The FY 1987 funding is required to continue design and construction to maintain the project schedule for hot operations in early FY 1990, and to maintain the total estimated cost of $870 million. In FY 1987 final design will continue to more than 97 percent complete. Construction of the main process buildings and support facilities will continue to approximately 65 percent complete and procurements will be made for essential construction materials and equipment.

10. Details of Cost Estimate: a/

	Item Cost	Total Cost
a. Engineering, design and inspection		$ 208,000
(1) Engineering and design at 29% of construction costs (item b)	$ 176,000	
(2) Engineering control and inspection at 7% of construction costs (item b)	32,070	
b. Construction costs		578,402
(1) Improvements to land	13,000	
(2) Buildings	142,500	
(3) Other structures such as fan house, exhaust stack and sand filter	35,000	
(4) Special facilities such as piping processing equipment, mechanical systems and services	367,000	
(5) ADP equipment	3,000	
(6) Utilities	18,000	
c. Standard equipment		4,020
d. Contingency at approximately 11% of the sum of items a - c		80,500
Total estimated costs		$ 871,000

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a/ The above estimates are based on approximately 80% detailed design.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
VERIFICATION AND CONTROL TECHNOLOGY

DEFENSE PROGRAMS
ATOMIC ENERGY DEFENSE ACTIVITIES
(TABULAR DOLLARS IN THOUSANDS. NARRATIVE MATERIAL IN WHOLE DOLLARS.)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs. Base
Verification and Control Technology (DP)					
Verification and Control Technology (V&CT)					
Operating Expenses					
Program Resources.....	$ 70,460	$ 80,425	$80,425	$ 91,100	$+10,675
Program Direction.....	3,177 a/	3,776 b/	3,776 b/	4,400	+ 624
Subtotal Operating Expenses............	$ 73,637	$ 84,201	$84,201	$ 95,500	$+11,299
Capital Equipment......	2,000	5,600	$ 5,600	4,200	- 1,400
Construction...........	1,000	4,500	4,500	2,000	- 2,500
Verification and Control Technology..............	$ 76,637	$ 94,301 c/	$94,301 c/	$101,700d/	$+ 7,399
Total FTE's..............	64	66	66	66	--

Authorization: Sections 35 and 36, P.L. 87-297

a/ Reflects comparability adjustment reduction of $23,000 for one FTE transferred to Weapons Program and $40,000 rescinded in accordance with Section 2901 of the Deficit Reduction Act of 1982 (P.L. 98-369).

b/ Reflects comparability adjustment reduction of $24,000 for one FTE transferred to Weapons Program.

c/ Reflects $3,000,000 sequestered to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (P.L. 99-177).

d/ The resources contained in the Verification and Control Technology decision unit support both the Office of International Security Affairs and Deputy Assistant for Intelligence.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Verification and Control Technology
(In Thousands of Dollars)

FY 1986 Adjusted Appropriation/FY 1987 Base	$ 94,301
Program increases and decreases:	
o Detection Technology	
Supports space detection activities, improved verification techniques, advanced technology development and replacement of outdated systems	+ 7,609
o Analytical Support	
Provides for technical analyses with increased emphasis on material tracking, foreign application of technology to space, and nuclear terrorism intelligence	+ 3,066
o Program Direction	
Provides for increased personnel expenses	+ 624
o Capital Equipment	
Reflects completion of major capital equipment needs at Headquarters	- 1,400
o Construction	
Funding decrease for Space Science Lab (Project 85-D-171)	- 2,500
FY 1987 Request	$ 101,700

DEPARTMENT OF ENERGY

FY 1987 CONGRESSIONAL BUDGET REQUEST

VERIFICATION AND CONTROL TECHNOLOGY

Program Overview

The comprehensive goal of the Verification and Control Technology program is to support the development and execution of U.S. national security and foreign policies in treaty verification, intelligence, arms control, and export control as they pertain to the Department of Energy's defense-related responsibilities. The program: 1) conducts advanced research, development and fabrication of nuclear and other advanced technology weapon detection and characterization systems, including satellite-based sensors, in support of treaty verification and other National Command Authority requirements; 2) provides for development and operation of onsite and regional instrumentation for verification of compliance with current and potential nuclear test and arms control treaties; 3) reviews exports of materials, equipment and technology within DOE's areas of responsibility; 4) provides technical and analytical support in international nuclear arms control negotiations and related interagency deliberations; and 5) manages DOE's portion of the National Foreign Intelligence activities including analyses of foreign nuclear weapons and weapons material data, and assessments of foreign use of technology in energy, space and weapons. The first four activities funded under this program are managed by the Office of International Security Affairs under the Deputy Assistant Secretary for Security Affairs, and the fifth activity by the Deputy Assistant Secretary for Intelligence.

FY 1986 accomplishments include the:

- Delivery on time and within budget of satellite-borne nuclear explosion sensors for various satellites.
- Evaluation of an experimental regional seismic array in Norway in cooperation with the Defense Advanced Research Projects Agency (DARPA) to determine the value of this technology for verifying treaties limited or prohibiting underground nuclear tests.
- Review of approximately 7,000 applications for export licenses for nuclear and nuclear-related materials equipment and technology to ensure that exports are consistent with U.S. national security and nuclear nonproliferation policy.
- Nuclear weapon technical analyses for DOE policy development for international arms control deliberations.
- Support in production of National Intelligence Estimate relevant to DOE responsibilities.

Specific objectives for FY 1987 and beyond include:

- Continued fulfillment of the delivery requirements of satellite-borne sensors in support of nuclear treaty verification and other monitoring requirements.

- Maintenance and expansion of DOE's technology base to meet emerging treaty verification and monitoring requirements.

- Review of export license applications in order to preclude the transfer of sensitive commodities and technologies to countries of strategic or proliferation concern.

- Pursuing technical studies and providing technical expertise in interagency activities in support of arms control negotiations.

- Improved DOE capability to assess potential terrorist activities against nuclear facilities and programs.

Justification

	FY 1987 Base	FY 1987 Request
Verification and Control Technology		
Operating Expenses - Program Resources......	$ 80,425	$ 91,100
Program Direction......	3,776	4,400
Capital Equipment............................	5,600	4,200
Construction.................................	4,500	2,000
	$ 94,301	$ 101,700

The FY 1987 request represents a $7,399,000 increase over the FY 1986 adjusted appropriation.

This increase is attributed to initiation of a proposed joint technical experiment with the Soviet Union and a cooperative scientific venture with the Peoples Republic of China; response to National Security Council directives concerning improvement of U.S. treaty verification capabilities; space borne detection activities; technology development activities; greater requirements for analysis of national security and foreign policy pertaining to nuclear weapons-related issues; improved capabilities to track U.S.-origin SNM abroad; and related capital equipment requirements at the national laboratories.

Operating Expenses - Program Resources

Verification and Control Technology activities can be divided into two categories: detection and verification technology and analytical support. Detection/verification technology projects develop the means of detecting, measuring and characterizing nuclear or other advanced weapons activities. Analytical support activities utilize nuclear and advanced weapon technical expertise to evaluate arms control proposals, make determinations on export license applications, assess technology transfer issues, and analyze foreign weapon-related activities. Verification and Control Technology efforts are carefully coordinated with the Departments of Defense (DOD), State (DOS), and Commerce (DOC); Arms Control and Disarmament Agency (ACDA); Defense Advanced Research Projects Agency (DARPA), Central Intelligence Agency (CIA); and the Nuclear Regulatory Commission (NRC).

Detection Technology

In FY 1987 $67,814,000 is requested for detection/verification technology activities, a $7,609,000 increase over the FY 1986 adjusted appropriation.

DOE develops and fabricates satellite instrumentation and is a major participant in the national effort employing satellite-borne sensors to monitor the atmosphere and space for nuclear detonations. Satellite sensors provide test ban treaty verification data in support of the Limited Test Ban Treaty (LTBT) and other collection requirements. The DOE produced sensors provide worldwide surveillance and intelligence monitoring of nuclear tests carried out in the atmosphere, near earth or in near space.

In FY 1987, the Department will be required to deliver satellite sensors for several satellites. Resources are also required to conduct advance fabrication and procurement activities necessary to meet the delivery schedules for future years. As part of the space detection efforts, the Verification and Control Technology program also provides operational support such as the maintenance of appropriate facilities, procedures and documents to allow for proper design, fabrication, integration, testing, traceability, and as needed, failure analysis and flight-quality repair of DOE instrumentation.

Directed energy weapons (DEW), both ground-based and in space, are of increasing interest. The United States has embarked on an intensive DEW development program. DOE is conducting research on systems capable of detecting the emissions of directed energy devices.

U.S. nuclear test detection capabilities are currently focused on the Northern Hemisphere. In the near term, remote sensors are being developed and tested to detect and monitor nuclear debris in the Southern Hemisphere. The Department successfully demonstrated the capability to remotely monitor the atmosphere for nuclear debris using free-floating buoy platforms, a technology which is being adapted for ground stations. A network of surface air sampling stations is in place around the world to aid in detecting nuclear weapon tests in the atmosphere. Deployment, test and evaluation of the system at remote locations is scheduled in FY 1987.

The U.S. operates a global network of ground-based sample collection sites. Samples from these sites undergo DOE analysis as part of a cooperative program with other agencies.

DOE's in-country seismic program supports R&D for developing enhanced seismic verification capability at regional (short range) and local distances. This program ensures that DOE can fulfill its responsibility to provide in-country seismic equipment/systems to support U.S. verification of future nuclear test treaties. The DOE in-country seismic program conducted in FY 1987 will initiate transfer of the operation and maintenance of DOE's Regional Seismic Test Network (RSTN). The RSTN, a five-station network located in the United States and Canada, is a research tool operated to gain experience in the use of an in-country seismic system to monitor compliance with nuclear test restrictions through the detection of regional versus teleseismic signals. The RSTN provides the opportunity for experiments on regional seismic discriminants to distinguish between seismic signals generated by underground nuclear explosions and those generated by earthquakes, mine excavation activities, etc. The strengths and weaknesses of the existing system design will continue to be examined. In FY

1987, increased emphasis will be placed on use of high frequencies for detecting cavity-decoupled explosions. Additionally, the RSTN has provided the opportunity to collect data on the reliability of unmanned high technology seismic detection equipment operating under field conditions with minimum maintenance.

An advanced element of DOE's in-country seismic research program is the design, development, deployment and operation in Norway of a regional seismic array system. In a cooperative effort, the DOE and DARPA deployed and began operating an array system in 1984 under existing arrangements between DARPA and Norway. In FY 1985 the array achieved complete operational status and will collect regional seismic data for two to three years. The data will provide an additional basis for evaluating the utility of an array system for verifying compliance with treaties limiting or banning underground nuclear tests.

In FY 1986 negotiations began with the People's Republic of China (PRC) on a cooperative effort to culminate in the installation of a regional seismic array in the PRC. This array will provide valuable data on low-level seismicity not obtainable at teleseismic distances and on seismic wave propagation in the central Eurasian continent. Conceptual design of the array began in FY 1986, with fabrication to begin in FY 1987 after the U.S. and the PRC have reached agreement on the array installation.

The nonseismic detection (infrasonic monitoring) technology efforts in FY 1987 will focus on continued development of equipment and signal processing techniques for operational systems. Microphone arrays are used in the infrasonic technique for long-range monitoring of very low frequency sound waves generated by nuclear explosions that propagate in the upper levels of the atmosphere. This program has demonstrated the capability of detecting underground nuclear explosions and is developing the methodology for optimizing measurement and signal processing procedures. The infrasonic monitoring system could provide a valuable verification tool since it would not have to be deployed within the borders of a country to verify compliance with nuclear testing constraints. The overall goal of this program is the design, development, test and evaluation of a prototype system that may be deployed at overseas locations to supplement existing verification methods. The infrasonic program in FY 1987 will focus on deployment of trial remote arrays to test equipment and procedures, e.g., remote data transmission. Development of standardized processing and interpreting procedures for efficient handling of data from the array is an objective of the infrasonic program.

DOE bears certain responsibilities under the not-yet-ratified Threshold Test Ban Treaty (TTBT) and its companion Peaceful Nuclear Explosions Treaty (PNET). Under the PNET, the U.S. and the Soviet Union would be permitted to conduct observations and examinations of PNEs on each other's territories to make sure that individual explosions do not exceed the TTBT threshold. The Verification and Control Technology program is charged with providing the equipment, manpower, expertise, and full range of capabilities to permit the U.S. to fulfill the onsite verification responsibility of the PNET and verification responsibility of the TTBT.

DOE's role in this area of onsite treaty monitoring was recently expanded. These direct the verification community to take policy and technical actions designed to improve the verification of treaties limiting underground nuclear testing. In response to these directives, DOE is undertaking an effort utilizing direct yield

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Defense waste processing facility, Savannah River, South Carolina — 2. Project No. 81-T-105

11. Method of Performance:

Independent contractors will be used for selected tasks under the supervision of the operating contractor.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	Total
a. Total project costs							
(1) Total facility costs							
(a) Const. line item.	$127,603	$155,295	$201,800	$235,100	$114,100	$ 36,102	$ 870,000
(b) PE&D.............	16,965	0	0	0	0	0	16,965
Total fac. costs	144,568	155,295	201,800	235,100	114,100	36,102	886,965
(2) Other project costs							
(a) R&D.............	99,296	8,150	4,120	3,700	3,478	3,721	122,465
(b) DWPF tech support	12,233	13,504	15,603	20,998	16,215	5,129	83,682
(c) Other proj. related costs....	49,677	8,730	21,647	11,860	8,116	2,534	102,564
Total other proj. costs....	161,206	30,384	41,370	36,558	27,809	11,384	308,711
Total proj. costs (1&2)	$305,774	$185,679	$243,170	$271,658	$141,909	$ 47,486	$1,195,676

b. Other related annual costs (estimated life of project: 30 years).

(1) Facility operating costs (including decontaminated salt disposal)....................................	$ 74,000
(2) Capital equipment not related to construction but related to programmatic effort in the facility....	6,000
Total other related annual costs (1989 dollars)...................	$ 80,000

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
  (1) Total facility costs
    (a) Construction line item - no narritive required.
    (b) PE&D - no narrative required.

1. Title and location of project: Defense waste processing facility, Savannah River, South Carolina — 2. Project No. 81-T-105

13. Narrative explanation of total project funding and other related funding requirements: (continued)

(2) Other project costs

(a) R&D

Optimization studies, completion of R&D support for demonstration of the process, technical interface with transportation and repository systems, and waste form optimization and characterization are estimated to cost $122,465,000.

(b) DWPF technical support

Technical support to design and construction during demonstration of equipment plus testing and run-in of DWPF equipment prior to in-plant installation is estimated to cost $83,682,000.

(c) Other project costs

Engineering studies, plant liaison drawing review, and coordination of development data and design, and construction checking are estimated to cost $102,564,000.

Additional funds associated with activities such as preparation of procedures, training of operating personnel, procurement of supplies, and system checking will be requested from the operations budget in years after 1986.

b. Other related annual costs - It is estimated the facility will be used 30 years for its programmatic purpose.

(1) Annual facility operating costs

Facility operating costs including labor, overhead, utilities and services, process technical support, cold feed chemicals, canister materials, and miscellaneous supplies are estimated to be $74,000,000.

(2) Capital equipment not related to construction but related to programmatic effort in the facility

It is estimated that replacement costs for melter, vessels, pumps, motors, etc., will be $6,000,000

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	Gramm-Rudman-Hollings	Subtotal	Comparability Adjustments	Adjusted Approp. Total
Verification and Control Technology (DP)					
Verification and Control Technology					
Operating Expenses	$ 87,225	$ -3,000	$ 84,225	$ -24	$ 84,201
Capital Equipment	5,600	-	5,600	-	5,600
Construction	4,500	-	4,500	-	4,500
Total, Verification and Control Technolgy	$ 97,325	$ -3,000	$ 94,325	$ -24	$ 94,301

measurement techniques in conjunction with normally scheduled underground explosions at the Nevada Test Site to determine to what extent TTBT verification capabilities can be improved. Throughout FY 1987, appreciable effort and resources will be applied on the nuclear weapon tests to properly evaluate this verification technique under expected TTBT conditions and to provide state-of-the-art, field-worthy equipment, including the necessary complementary local seismic network and a trained cadre for an onsite verification team.

The Verification and Control Technology program has the responsibility for the development, production and installation of onsite, local, and regional verification systems in the event of a Joint Technical Experiment (JTE) with the Soviets, as proposed by the President in 1985. In FY 1987 the equipment necessary for deployment will be fabricated.

Analytical Support

In FY 1987, $23,286,000 is requested for analytical support activities, a $3,066,000 increase over the FY 1986 adjusted appropriation.

Verification and Control Technology's analytical support activities are conducted through the national laboratories and private contractors in support of DOE's export control, technology transfer, arms control, weapons intelligence, and proliferation intelligence responsibilities. These activities provide a factual and analytical base to support U.S. needs in understanding the national security implications of possible test ban treaties, of export license decisions as they relate to proliferation and technology transfer concerns, and of foreign nuclear weapon programs. These activities serve the needs of the DOS, DOD, DOC, ACDA, the NRC, and the Intelligence Community, as well as DOE. Energy intelligence relating to energy supply, production transportation and utilization will be conducted to assess the effects of potential oil supply disruptions and to support the Department's emergency preparedness activities. The weapons, nuclear proliferation, energy supply and foreign technology assessments intelligence activities are executed by the Deputy Assistant Secretary for Intelligence. The arms control, export control, technology transfer and nuclear nonproliferation policy activities are executed by the Office of International Security Affairs.

Weapons intelligence within the Department of Energy (DOE) is responsible for supporting analysis for treaty negotiation, monitoring and verification. Of special concern is the threat to the U.S., its nuclear weapons and the U.S. nuclear weapons complex from foreign nuclear and nuclear-associated weapons systems capabilities.

DOE has established an education program for the Intelligence Community so that it may more effectively collect, identify, and analyze data to understand foreign nuclear capability and threats. Courses presented include an underground nuclear weapons testing orientation; policy and technical aspects of nuclear weapons proliferation; technologies of directed energy weapons; and the indicators of nuclear terrorism.

U.S. laws, treaties, and policies seek to promote the development of the peaceful applications of nuclear power while limiting the spread of nuclear weapons. Primary policy is governed by the Non-Proliferation Act of 1978 and the President's policy and decision statements of July 16, 1981, and June 4, 1982. The

DOE proliferation intelligence program supports the national policy with a program of studies of the nuclear capability in potentially proliferating countries. Additional studies follow the technology transfer policies, incentives and activities of possible nuclear supplier nations, and the worldwide movement, production, and utilization of SNM. This analysis provides key data for export and licensing decisions, foreign policy initiatives, and the overall nuclear capability assessment for both DOE and other U.S. Government agencies. FY 1987 resources will provide for continuation of the ongoing nuclear capability assessments for all currently identified possible proliferant countries, including new nuclear fuel cycle and weapons technology-related developments. The funding will also support continuing analysis of the proliferation impact of actions by technology supplier nations and the maintenance fuel cycle data base for use by DOE and other. A complementary system will also be developed and made operational as rapidly as possible to improve DOE capabilities to track U.S. origin SNM abroad. Modern data processing and knowledge base techniques will be employed as necessary to cope with accounting difficulties arising from burgeoning reprocessing, transformation and recycle of U.S. origin SNM in foreign thermal and breeder reactor programs.

The foreign technology intelligence assessments examine basic science and technology in the areas of: directed energy-related technologies; space nuclear power; technology transfer; and nuclear terrorism. This activity supports decisionmaking on export case reviews, foreign cooperation visits and programs, and on strategic analyses at both DOE and other U.S. Government agencies in carrying out legislative and executive mandates. This includes support to the National Security Council and Senior Interagency Group for Technology Transfer (SIG/TT).

Current intelligence on energy security meets the Department's needs for information on the prospects for disruption of oil supplies due to political, economic, and social instabilities within major producing nations of the Persian Gulf. The status of present and potential threats or conflicts must be analyzed and reported relative to the vulnerability and recovery capability as they impact the DOE responsibilities. Information on plans of advanced countries to limit economic damage of petroleum supply disruption will be assessed to provide a basis for DOE's plans and policies in international energy emergencies.

DOE provides the necessary analysis and technical review of more than 7,000 export cases each year to ensure that proposed exports are consistent with U.S. national security and foreign policy objectives. DOE serves as the secretariat for the interagency National Security Council Subgroup on Nuclear Export Coordination (SNEC), which reviews and makes recommendations on particularly sensitive export cases, based on the technical analyses and intelligence data provided by DOE. This analysis includes the development and refinement of various lists. The Militarily Critical Technologies List (MCTL) is a Department of Defense-led project to compile and incorporate into U.S. export control regulations the technologies of concern to our defense and security. DOE has primary responsibility for all nuclear-related technologies. The MCTL technologies are to be incorporated into the Department of Commerce's Commodity Control List (CCL) and will require periodic update. Another list, the Nuclear Referral List (NRL) contains commodities with a nuclear application. DOE reviews all Department of Commerce referred applications for export items on the NRL, as well as any other items destined for nuclear end uses.

A major effort is under way to upgrade the international trigger lists for the application of safeguards to exports. DOE is the lead agency for technical support to the Department of State on this effort. During FY 1984 and FY 1985, international negotiations were concluded for gas centrifuge enrichment components and an expanded list of components for reprocessing facilities. The current effort, to be concluded in late FY 1986 or early FY 1987, will include a comprehensive list of selected items required for a proliferant to produce nuclear explosives.

DOE is a major participant in the Coordinating Committee (COCOM) export control process with primary responsibility for the International Atomic Energy List (IAEL). COCOM is a voluntary organization of NATO countries (minus Iceland) plus Japan which controls sensitive exports to communist countries. Many COCOM countries use the export lists to also control exports to countries of proliferation concern. DOE maintains a computerized data base of nuclearrelated COCOM cases and chairs interagency working groups which address these exports. DOE is charged with responsibility for a major review of the IAEL.

DOE provides direct technical support in the arms control area to U.S. delegations at such forums as the U.N. Conference on Disarmament and its Group of Scientific Experts; Test Ban Treaty talks in Geneva; the Non-Proliferation Treaty Review Conference and Preparatory Committee meetings; and the U.N. General Assembly Special Session on Disarmament. Extensive analytical activities are conducted in the areas of strategic and tactical nuclear weapon systems to support the development of DOE arms control policy positions. DOE, as the agency responsible for the development, testing, manufacturing and retirement of nuclear weapons, plays a major role in interagency deliberations on treaties, agreements and proposals related to nuclear testing. In this capacity DOE draws upon the expertise of the national laboratories for technical support and special studies.

The level of effort for these activities will be significantly increased from FY 1986 only in the areas of improved accounting and security of special nuclear materials in international commerce.

Operating Expenses - Program Direction

	FY 1987 Base	FY 1987 Request
Program Direction................................	$ 3,776	$ 4,400

In FY 1987, $4,400,000 is requested for program direction, a $624,000 increase over FY 1986. This funding is necessary to cover existing FTE levels and rising Federal manpower costs to manage an accelerated V&CT program initiated in earlier fiscal years and continuing in FY 1987.

Program Direction funds provide for the salaries, benefits, and travel expenses for 66 FTE's associated with the management and direction of this program at the Headquarters facility located in Washington, D.C. These employees are responsible for technical and analytical program management of field activities, and execution of Headquarters staff functions.

	FY 1987 Base	FY 1987 Request
Personnel Services and Benefits		
Personnel Compensation..........................	$ 3,231	$ 3,800
Personnel Benefits..............................	280	295
Subtotal..	$ 3,541	$ 4,155
Contractual Services		
Travel..	$ 270	$ 300
Subtotal..	$ 270	300
Total, Program Direction........................	$ 3,776	$ 4,400

Duties of Verification and Control Technology Headquarters personnel include:

- o Management, guidance, coordination and continuous review of research, development, test, and fabrication of systems for treaty verification and intelligence collection support; nuclear weapons treaty verification; and intelligence activities accomplished in the weapons complex.
- o Participation in Interagency Groups related to arms control, nonproliferation and export control matters.
- o Processing export applications related to the control of nuclear and nuclear-related materials, technology, and equipment.
- o Participation in arms control negotiations.
- o Providing Secretarial Officers with intelligence information relating to their programmatic responsibilities.
- o Assessment of information in support of nuclear nonproliferation and technology transfer control policies.
- o Participation in committees of the Director of Central Intelligence in matters relating to foreign nuclear weapons and foreign nuclear energy programs, capabilities, and resources.

Capital Equipment

	FY 1987 Base	FY 1987 Request
Capital Equipment................................	$ 5,600	$ 4,200

The FY 1987 request of $4,200,000 for capital equipment resources represents a $1,400,000 decrease from FY 1986 caused by completion of major needs relative to automation activities at the Headquarters. The FY 1987 funding request is required primarily at the various national laboratories to provide the high priority equipment needs generated by the technology and analytical support functions. These funds will support purchase of equipment to provide more timely intelligence analysis; upgrade existing electronics equipment; upgrade computer software/hardware systems; update technology of accessories to existing laboratory equipment; and develop the means for incountry treaty verification. The capital equipment supporting the Detection Technology activity constitutes the base of advanced technology development for V&CT activities at the national laboratories.

	FY 1987 Base	FY 1987 Request
Construction......................................	$ 4,500	$ 2,000

DOE will construct the Space Science Laboratory at Los Alamos National Laboratory (Project 85-D-171). This facility will be used for design, development, fabrication, assembly, test, calibration and quality control of space instrumentation, as well as for associated base technology efforts. The facility is needed to accommodate growth and increased delivery requirements already programmed into the late 1990's. Without the automated test, calibration, and checkout capabilities of the new facility, the manual methods now used could result in incomplete testing, less reliable instrumentation, and schedule delays. The total estimated cost of the facility will be $7,500,000 of which the final $2,000,000 is requested in FY 1987 for construction, design and procurement of standard equipment and for standard construction contingency. Construction Project Data Sheet 85-D-171 is attached.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEET
ATOMIC ENERGY DEFENSE ACTIVITIES
VERIFICATION AND CONTROL TECHNOLOGY

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Space Science Laboratory, Los Alamos, New Mexico

2. Project Number: 85-D-171

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3. Date A-E Work Initiated: 2nd Qtr. FY 1985

3a. Date Physical Construction Starts: 1st Qtr. FY 1987

4. Date Construction Ends: 2nd Qtr. FY 1988

5. Previous Cost Estimate: $7,800
Date: 7/83

6. Current Cost Estimate: $7,500
Date: 2/85

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7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$ 7,500	$ 1,000	$ 1,000	$ 251
1986	0	4,500	4,500	3,300
1987	0	2,000	2,000	3,500
1988	0	0	0	449

8. Brief Physical Description of Project

This project will provide for the construction of a design, test, and fabrication facility required to accommodate growth programmed by the Office of International Security Affairs (ISA) over the last half of this decade and into the 1990's, primarily in satellite-based test detection activities involving technology development, developmental and prototype instrumentation on satellites and rockets, and operational deployment of instrumentation.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Space Science Laboratory, Los Alamos, New Mexico

2. Project Number: 85-D-171

8. Brief Physical Description of Project (cont'd)

This facility will include a building of approximately 21,000 sq. ft. to accommodate about 40 people. It will contain development laboratories, instrumentation systems fabrication and assembly areas, test and calibration areas, drafting areas, controlled storage, clean areas, a vacuum laboratory, low-level radioactive source material storage, offices, computer facilities, a data distribution room a conference area, a library, a machine shop, storage areas, and support facilities.

As planned, the building will use a structural space frame system of construction with the most cost-effective materials available to allow the maximum open area, flexibility, and future expansion. A minimal-maintenance building envelope will be used for the exterior finish.

The building will be barrier-free for handicapped persons with an elevator provided for personnel, transport of instrumentation, and building services.

This project conforms to the Laboratory Long-Range Site Development Plan and Five-Year Interim Implementation Plan.

The site is served by existing utilities. Site work will include the expansion of an existing parking lot, curbs and walkways, landscaping, drainage, and erosion control. Utilities will include sanitary sewer, water, electrical power, steam and condensate, and communications services.

This project is located in an area served by an existing central energy system. The steam will be converted to hot water for space heating. Steam service will also be provided for space humidification.

The energy consumption of this facility will be minimized with energy conservation considerations including insulation, building orientation, earth-sheltered construction, passive solar features, auxiliary air fume hoods, heat recovery, economy-cycle cooling, night and weekend setback/shutdown, and energy efficient electrical and mechanical systems. Energy conservation features and systems will be integrated into the design at the beginning of Title I design in accordance with the General Design Criteria Manual, DOE Order 6430.1.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: Space Science Laboratory, Los Alamos, New Mexico

2. Project Number: 85-D-171

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8. Brief Physical Description of Project (cont'd)

Summer temperature and humidity control will be provided for the computer areas, laboratories, small accelerator lab, and conference rooms by mechanical refrigeration. Evaporative cooling will provide summer temperature control for the drafting areas, offices, and library. Mechanical ventilation will be provided for the machine shop, equipment rooms, and rest rooms. Hoods will be required for some laboratories.

Power will be distributed throughout the building at 120/208Y volts and 277/480Y volts. The building will be equipped with a communications system and an intrusion detection system. Fire protection will be provided by a hydraulically designed wet-pipe sprinkler system. Plumbing and piping systems will consist of steam and condensate, heating hot water, potable hot and cold water, industrial hot and cold water, sanitary sewer, roof drain, compressed air, liquid nitrogen, nitrogen, house vacuum, lab vacuum, vacuum pump exhaust, circulating cooling water, and distilled water.

Standard equipment will include office and laboratory furnishings, machine shop equipment, computer terminals, audio-visual equipment, electronic test equipment, and conference room furnishings.

FY 1985 funding was used for Title I design. FY 1986 funding will be used for Title II design of the building and initial procurement leading to construction. FY 1987 funding will provide for construction, design and procurement of standard equipment, and construction contingency.

9. Purpose, Justification of Need for, and Scope of Project

The purpose of the propposed project is to provide the facilities for the development, fabrication, assembly, testing, calibration, quality control, and operations associated with our satellite-related activities in the verification programs.

The verification program consists of three separate areas: satellite-based test detection, ionospheric monitoring, and infrasonic measurements. The satellite activities are by far the largest component and are expected to grow over the next several years, having received a large funding step in 1982 to support a vigorous technology development activity. We expect this development to continue with developmental and prototype instrumentation on satellite and rocket flights. The operational satellite program is growing also, with designs now being developed to be used in the programmatic instrumentation deployments on

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1. Title and Location of Project: Space Science Laboratory,
Los Alamos, New Mexico

2. Project Number: 85-D-171

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9. Purpose, Justification of Need for, and Scope of Project (cont'd)

satellites during the last half of this decade and into the early 1990's. Follow-up operational programs for the 1990's are planned and are now in conceptual development. The rate at which satellite and rocket instruments must be produced, tested, and integrated is scheduled to increase markedly in the next five years. Further, the Space Shuttle will be the launch vehicle for most satellite systems, and, because of the human involvement, testing, quality, and safety issues must be much more elaborate than in past and current programs.

The project will provide new or expanded facilities, such as space for development laboratories, clean facilities, assembly bays, and modern computer-controlled test and calibration areas, for satellite and rocket instrumentation supporting the verification programs.

The technical mission of the sponsoring agency, as it relates to the proposed project, is to participate in the national verification programs. The DOE and Laboratory roles in this area are to develop and provide satellite instrumentation and to participate in deployment, operation, and data analysis associated with this instrumentation. The proposed facility is required to provide the new facilities necessary for performing the mission under evolving national requirements and new state-of-the-art technology.

Our laboratory facilities, clean space capabilities, modern automated test areas, data-handling facilities, and other resources are insufficient to carry out our verification responsibilities in a manner consistent with requirements. Without the project, the Laboratory's participation in these programs will continue to some extent, at least in the near term. In the verification programs, we will continue to participate by providing the small-scale instrumentation at the rate that has been adequate in the past. With the advent of the Space Shuttle and ever-increasing requirements for performance and quality, as well as the scheduled increases in instrumentation quantity, we will be unable to fulfill our obligations for long. Without the automated test, calibration, and checkout facilities, the manual methods presently employed will result in incomplete testing and less reliable instrumentation. In summary, the capabilities of the new facility are urgently needed; continuing in an already outmoded operation does not approach the efficiency, testing completeness, quality assurance (QA), and credibility promised by state-of-the-art technology in the new facility.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: Space Science Laboratory,
Los Alamos, New Mexico

2. Project Number: 85-D-171

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9. Purpose, Justification of Need for, and Scope of Project (cont'd)

The greatest urgency stems from already approved program schedules calling for a marked increase in the instrument delivery rate. Our participation in these missions depends on our ability to meet our schedule commitments and to use efficiently the opportunities afforded by the shuttle. Although a crash program to provide the proposed facility is not justified, the planned completion date in 1987 should not be extended.

The project, as conceived, is compatible with neighboring laboratory facilities. Construction in TA-3 near existing Earth and Space Science (ESS) Division facilities will allow future expansion to accomodate strong anticipated growth in Technical Intelligence Programs, and to provide facilities for activities now located elsewhere but planned for relocation in the long-range plan.

No special access or relationship to laboratory facilities for handling plutonium, high explosives (HE), other special nuclear materials, or strong radiation sources is required.

The major identified need of the using organization, ESS Division, is for the facility to provide a classified area in which to carry on activities associated with the verification program. These include instrumentation development, design, fabrication, assembly, test, calibration, and quality control activities. Because much of the instrumentation will be used in very expensive satellite and space shuttle systems, reliability and safety are emphasized. Qualifying materials, components, and designs, and maintaining traceability of systems delivered for flight are also necessary. Research-quantity radioactive sources and relatively low-level radiation-producing equipment will be used in these activities. The scientific and technical staff occupying the facility require a classified conference room and classified file room.

Development and design studies include instrumentation concepts and approach, physics experiments and measurements to define design parameters, engineering analysis, breadboarding of electronic circuits, prototype construction and evaluation, etc. Physics and electronic developmental laboratories, staff shop, and areas for design, procurement, fabrication, and testing are required for these activities within the organization.

1. Title and Location of Project: Space Science Laboratory, Los Alamos, New Mexico	2. Project Number: 85-D-171

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Design interprets all of the above and produces detailed engineering, electronic, mechanical, thermal, and interface designs consistent with quality assurance and safety requirements.

Procurement, while straightforward in concept, can be long and complicated, especially for screened, high-reliability, and military specification components.

Acceptance inspection and testing not only determine if procured items meet specifications or procurement acceptance but also provide screening for performance, reliability, and QA. After testing, the items are then admitted to our parts stock and components are qualified for assembly into flight hardware. Controlled storage of components and subassemblies is necessary for items not immediately inserted into the fabrication activity. Both environment and access controls are required for many items.

Fabrication and assembly is a major activity extending from the construction of small subassemblies to complete payload packages. Facilities for preparing components cleaning space, as well as clean space for the assembly work, are required. In some cases, for certain materials and sensitive components, a controlled environment for temperature, humidity, and gas may be required.

Functional tests are carried out at many assembly stages and are repeated during operations with the full instrument assembly during handling and storage periods. These are normally performed at ambient conditions and are intended as a check on the "liveness" of the instrumentation.

Environmental tests are performed to ensure the instrumentation survival and performance in specification over a range of environmental conditions that includes the range expected in storage, shipping, integration, launch, and operational phases. Vacuum, thermal, and thermal vacuum tests will be carried out in the proposed facility, whereas vibration and shock tests will normally be performed elsewhere.

Calibrations are required to measure the instrumentation sensitivity to radiations for which the instrumentation is intended, and appropriately, to interfering stimuli to which the instrumentation may be exposed. Generally, in space we are attempting to measure x rays, gamma rays, neutrons, charged particles, and other signals in a mixed background. Radioactive sources, small accelerators, and other equipment, are required to perform the calibration tests.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: Space Science Laboratory,
Los Alamos, New Mexico

2. Project Number: 85-D-171

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9. Purpose, Justification of Need for, and Scope of Project (cont'd)

After instrumentation has been partially or fully assembled, it may be stored for some period before further work or delivery is scheduled. Again, both access and environmentally controlled storage space is required. Physically, the area may be combined with the component storage area already described; however, storage details and control procedures may be different.

When instrumentation packages are scheduled for delivery to another facility, whether to Sandia Laboratories, with whom we work closely, to a military spacecraft contractor, to NASA, or to a field station where we are carrying out experiments, a final inspection and a functional test are usually required to confirm that the material is in proper condition for delivery. Delivered items will range from modules or subassemblies to complete payload assemblies comprising several complete instruments. Some of these will be for integration into additional payload, rocket, or satellite systems; some will be for repair, modification, or retrofit of systems already delivered, and some will be complete operating systems. In any case, predelivery activities must ensure that all appropriate requirements have been met, and that the material is flight ready or ready for deployment.

The actual instrumentation delivery must maintain the quality, performance, calibrations, and overall integrity of the items with mechanical, thermal, and other environmental protection as required. We use special shipping cases and materials, as appropriate. Space is required for preparing and packaging items for delivery and also for storing the shipping cases when they are not in use.

Field operations, as the term implies, are those activities carried out away from Los Alamos. For certain operations, space in the proposed facility for additional functions is required to support those operations. Operations feed data or questions back to Los Alamos for operational analysis and further interactions. Laboratory tests, instrument modification, repair, and design change evaluations all result from field operations.

More in-depth data analysis and programmatic data interpretation require use of both our distribution processor and the Central Computer Facility (CCF). A computer terminal room and appropriate data file are required in the Space Science Laboratory. Actual distributed processor facilities are to be located in another building.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: Space Science Laboratory, Los Alamos, New Mexico

2. Project Number: 85-D-171

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9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Modern state-of-the-art methods are essential to the quality and cost efficiency required by our programs. Computer-automated test and evaluation capabilities will achieve the utmost from our testing, calibration, and other appropriate functions. The proposed facility is strongly oriented toward providing the instrumentation space and equipment required to meet our responsibilities.

No unusual design or construction requirements are anticipated.

10. Details of Cost Estimate*

a. Engineering, design, and inspection at about 15% of construction costs, Item b.**		$ 745
b. Construction costs		5,100
(1) Improvements to land, including landscaping, parking lot expansion, curbs and walkways, and drainage	$ 260	
(2) Laboratory-office building 21,000 sq. ft. at approximately $210 sq. ft.	4,440	
(3) Other structures	0	
(4) Special facilities	0	
(5) Utilities, including fire and potable water service, sanitary sewer, electrical power, steam and condensate, and data communications services	400	
c. Standard equipment, including modular laboratory and office furnishing systems, shop equipment, laboratory equipment, and clean modules		1,110
Subtotal		$ 6,955

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Space Science Laboratory, Los Alamos, New Mexico

2. Project Number: 85-D-171

10. Details of Cost Estimate* (cont'd)

d. Contingencies at approximately 8% of above costs ***	545
Total project cost	$ 7,500

*The Laboratory used escalation rates of 2.9% for FY 1983, 4.9% for FY 1984, 8.3% for FY 1985, 9.3% for FY 1986, and 7.1% for FY 1987. These rates were forecasted using "Data Resources Incorporated" forecasting services. These services were contracted by the DOE.

**Engineering, design, and inspection costs are projected from historical records and experience, then applied based on the complexity of the project.

***Contingencies are applied to items based on the uncertainties of the development at the conceptual level.

11. Method of Performance

Design and inspection of the facility will be performed under a negotiated architect-engineer contract. Fixed-price contracts and subcontracts will be awarded for construction on the basis of competitive bids. Design, procurement, and installation of standard equipment will be performed by the operating contractor.

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: Space Science Laboratory, Los Alamos, New Mexico

2. Project Number: 85-D-171

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12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Yrs.	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project funding						
(1) Total facility costs						
(a) Construction line item..........	$ 0	$ 251	$ 3,300	$ 3,500	$ 449	$ 7,500
(b) CP&D..........................	0	0	0	0	0	0
(c) Expense funded equipment........	0	0	0	0	0	0
(d) Inventories.....................	0	0	0	0	0	0
Total facility costs...........	$ 0	$ 251	$ 3,300	$ 3,500	$ 449	$ 7,500

	Prior Yrs.	FY 1985	FY 1986	FY 1987	FY 1988	Total
(2) Other project funding						
(a) Conceptual design...............	$ 100	$ 0	$ 0	$ 0	$ 0	$ 100
(b) Other project-related costs.....	0	0	0	0	0	0
Total other project funding....	100	$ 0	$ 0	$ 0	$ 0	$ 100
Total project funding (Items 1 and 2)	$ 100	$ 251	$ 3,300	$ 3,500	$ 449	$ 7,600

b. Total related funding requirements (estimated life of project: 25 years)	
(1) Facility operating costs..	$ 250
(2) Programmatic operating expenses directly related to the facility.........................	0
(3) Capital equipment not related to construction but related to the programmatic effort in the facility...	480
(4) GPP or other construction related to programmatic effort in the facility..................	1,000
(5) Other costs..	0
Total other related annual funding requirements..	$ 1,730

CONSTRUCTION PROJECT DATA SHEET

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1. Title and Location of Project: Space Science Laboratory, Los Alamos, New Mexico

2. Project Number: 85-D-171

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13. Narrative Explanation of Total Project Funding and Other Related Requirements

a. Total project funding

(1) Total facility

(a) Construction line item. No narrative required.

(b) CP&D is not requested.

(c) No expense-funded equipment is anticipated for this project.

(d) None will be required.

(2) Other project funding

(a) Conceptual design costs. No R&D will be required.

(b) No other project-related funding is anticipated.

b. Total related funding requirements

This facility will be used for its programmatic purpose for 25 years.

(1) Facility operating costs

This category includes maintenance, janitorial, and utilities calculated from FY 1984 costs on a per square foot basis throughout the Laboratory and projected through FY 1988.

Maintenance and janitorial base costs were escalated at a 5% rate for FY 1985 and FY 1986 and at 7.5% for FY 1987 and FY 1988. Utility base costs were escalated at a 10.8% rate for FY 1985 and 12.1% for FY 1986 through FY 1988. Using maintenance and janitorial base costs (1984) of

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
NUCLEAR SAFEGUARDS AND SECURITY
ATOMIC ENERGY DEFENSE ACTIVITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request Vs.Base
Nuclear Safeguards and Security					
Operating Expenses					
Program Resources............	$48,118 a/	$45,345	$45,345	$53,417	$+8,072
Program Direction............	7,196 b/c/	7,253 b/	7,253	7,683	+ 430
Total Operating Expenses...	55,314	52,598	52,598	61,100	+8,502
Capital Equipment..............	4,700	4,455	4,455	4,800	+ 345
Construction...................	-	-	-	1,000	+1,000
Nuclear Safeguards and Security..	$60,014	$57,053 d/	$57,053	$66,900	$+9,847
Staffing Total FTE's Direct......	186 e/	182 e/	182	182	-

Authorization: Section 31, P.L. 83-703

a/ Reflects comparability adjustment of $2,567,000/seven FTE's to Weapons Program.
b/ Reduced by $69,000 in FY 1985 and $72,000 in FY 1986 to reflect comparability transfer of three FTE's to Weapons Program.
c/ Reflects rescission of $50,000 in accordance with Section 2901 of P.L. 98-369.
d/ Reflects $1,800,000 sequestered to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (P.L. 99-177).
e/ Reflects comparability adjustment of three FTE's to Weapons Program.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
Nuclear Safeguards and Security

(Dollars in Thousands)

FY 1986 Adjusted Appropriation/FY 1987 Base......................	$ 57,053
Program Increases and Decreases:	
Increased Operating Expenses provide 5% escalation..........	+ 2,267
Increase in Safeguards and Security operations to support such areas as computer security, Central Training Academy, communicated threat, insider threat, etc..	+ 2,903
Increase in Technology to support increased emphasis on insider threats................................	+ 1,871
Increase in the International program to provide strengthening of international safeguards in support of U.S. nonproliferation and national security...	+ 589
Increase in Classification program for enhanced technical programmatic support..............................	+ 442
Increase in Capital Equipment provide 5% escalation ($223,000) and other minor adjustments ($122,000)...........	+ 345
Increase in Program Direction covers additional salaries, benefits, travel, etc.............................	+ 430
Increase for Nuclear Safeguards Technology Laboratory, Los Alamos, New Mexico..........................	+ 1,000
FY 1987 Budget Request...	$66,900

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
Nuclear Safeguards and Security

(Tabular dollars in thousands. Narrative material in whole dollars.)

Program Overview

The Nuclear Safeguards and Security program is responsible for developing measures to assure adequate protection of DOE's nuclear weapons, nuclear materials, facilities, and classified information against theft, sabotage and terrorist activity; and providing safeguards technical support to U.S. and international activities designed to minimize the likelihood of proliferation of nuclear weapons. As part of this budget, the Classification program is responsible for implementing the DOE's classification and declassification activities.

Recent accomplishments include: establishment of a Central Training Academy to assure a high standard of readiness throughout DOE and to enable a uniform approach to training in the tactical, legal, and technical aspects of physical security; activities to support site-specific safeguards and security improvements; systematic evaluations of the significance of safeguards and security weaknesses; and the execution of agreements with the United Kingdom, France, European Community, and Federal Republic of Germany for cooperation in the development of safeguards instrumentation.

Program objectives include rescoping research and development activities to phase out "turn-key" deployment of safeguards technology and systems. Consistent with this rescoping initiative, research and development priorities will be shifted to address the potential "insider" threat at our critical installations starting in FY 1986, with implementation in FY 1987. Emphasis will be placed on nuclear material control and nuclear material accounting efforts (e.g., advanced measurement instrumentation) to help mitigate the threat of theft, diversion, or sabotage. As a supplement to this effort, policy guidance will be issued for the implementation of a "human reliability program" Department-wide. This program is needed to insure the continued reliability of personnel in critically sensitive nuclear material handling and other positions. The Department is continuing to enhance its computer security program to protect the sensitive classified information processed on computer systems. Federal Aviation Administration approval to implement new or reinstitute former airspace restrictions over sensitive DOE facilities is being sought. Master Safeguards and Security Agreements are being developed for all critical nuclear facilities. Objectives will continue to emphasize: improved effectiveness of safeguards and security through intensified guard force training utilizing the Central Training Academy, assistance in the identification of deficiencies at DOE facilities, support of classification activities, development of international safeguards, training of foreign safeguards personnel, development of technology in physical protection and material control and accounting, and tracking of nuclear material shipments.

The conduct of these activities will fulfill DOE's responsibilities under pertinent public laws and treaties or agreements, providing for improved protection of the DOE's nuclear weapons and nuclear materials facilities, and for sensitive classified information.

Justification

The FY 1987 request for the Nuclear Safeguards and Security Program is $66,900,000, an increase of $9,847,000 above the FY 1986 adjusted appropriation. The FY 1987 request provides $62,595,000 for the Nuclear Safeguards and Security portion of the program and $4,305,000 for the Classification portion of the program. The details of this budget are provided in the subsequent discussions of program efforts.

	FY 1986 Adjusted Appropriation	FY 1987 Request
Operating Expenses - Program Resources.........	$45,345	$53,417
- Program Direction.........	7,253	7,683
Capital Equipment...........................	4,455	4,800
Construction................................	-	1,000
	$57,053	$66,900

Operating Expenses - Program Resources

The FY 1987 request for program-related operating expenses is an increase of approximately $8,072,000 above the FY 1986 adjusted Budget Authority, but less than $3,500,000 over the level-of-effort Safeguards and Security program detailed in our FY 1986 budget. In FY 1986, the level-of-effort is being maintained by utilization of prior-years carryover.

Safeguards and Security Operations

The FY 1987 operating expense request is $32,721,000, a net increase of $4,323,000 above the FY 1986 adjusted appropriation of $28,398,000.

Safeguards Operations

The FY 1987 operating expense request for safeguards operations reflects a shifting of priorities, from a program of emphasis on large-scale hardening features and effective protection against outsider adversary intrusions, to a program of emphasis on protection against insider threats. Over the past approximately 3 years, efforts have been to assist in the identification of deficiencies at DOE facilities and assist field managers in applying state-of-the-art large-scale hardening features, surveillance equipment, and guard force response capabilities. Further consultation will be provided in these areas while encouraging participation by commercial vendors in direct field implementation projects funded from outlay programs. Emphasis in FY 1987 is on provision of technical assistance for required improvements at DOE facilities to counteract the insider threat of sabotage and diversion of special nuclear material, and demonstrate advanced integrated concepts at selected sites.

Those facilities for which the combined threat, vulnerability, and consequences are potentially highest will be given highest priority. During FY 1987, projects are required to support significant material control and accounting improvements at virtually all DOE facilities with attractive special nuclear material. Physical protection projects will be directed to provide assistance in effective protection against potential insider threats such as sabotage of vital facilities and components, and the diversion of nuclear material. Based on documented and comprehensive vulnerability analyses, substantial effort is directed in FY 1987 toward implementing advanced improvements in controlling and accounting for nuclear material to a level consistent with the DOE threat guidance. This includes projects for obtaining quality measurements or controls on specific nuclear materials that are inherently difficult to measure or are entrained within processing equipment and are inaccessible for conventional measurement methods. Projects addressing such problems at existing facilities are planned in FY 1987 at Idaho, Oak Ridge, Rocky Flats, Hanford, and Savannah River complexes. Rapid measurement and data management will be combined with information from process control and related physical protection subsystems. Similar advanced systems will be developed for new facilities under construction or soon to become operational at Idaho, Savannah River, Oak Ridge, and Richland.

These research and development activities also provide technology transfer, follow-on consultation to the field in the areas of vulnerability identification and effectiveness evaluations, safeguards training and workshops, and the application of state-of-the-art measurement methods for field office inspection and quality assurance.

The FY 1987 budget request also provides operational support to an effective Nuclear Materials Management and Safeguards System (NMMSS), and the DOE New Brunswick Laboratory. NMMSS is a computerized national data base of information on transactions and inventories of accountable nuclear materials. The New Brunswick Laboratory serves as the U.S. Government safeguards analytical laboratory to provide materials and services primarily to DOE field offices and contractors in fulfilling safeguards requirements essential for the control and accounting of nuclear materials and related materials. This includes: (1) providing measurement services in support of Government audit and inspection requirements; (2) assessing and evaluating measurement technology in support of DOE fuel cycle and weapons production activities; (3) developing, certifying, and distributing reference materials for calibration and standardization of materials measurements; and (4) assisting in technology exchange and training in measurement technology.

Security Operations

Security operations in FY 1987 will emphasize (1) increased developmental activities in computer security for improved protection of classified computer security operations, and (2) continue improving the capabilities of the Department's protective forces.

An enhanced computer security program is being developed within the Department to further improve the security of classified information processed with DOE computer systems. The research and development funding is planned to be increased in FY 1987 to meet the expanded national level requirements for applying secure/trusted computer systems when processing sensitive classified information. Recent inspections by the Defense Programs Inspection and Evaluation team have indicated a severe lack of security awareness in the area of computer security. A significant effort will be the training of the many hundreds or thousands of personnel who have been recently assigned computer security responsibilities. More secure means to enhance security of DOE's computer systems will be developed and implemented through local area networks, wide-band communications networks, or satellite systems.

The Department's Central Training Academy in Albuquerque will expand its capability to provide protective force officers with the tactical, legal, and technical training they need to effectively protect DOE facilities. Supporting this enhanced training capability will be the development and operation of the Engagement Simulation System (formerly Multiple Integrated Laser Engagement System, MILES) second generation of force-on-force training equipment for protective forces.

We will continue the development of advanced audio countersurveillance and suppression in technology in support of the intelligence community technical security operations, as well as continue to aid the DOE security and intelligence communities in a research and development program in technical surveillance.

The Nuclear Safeguards and Security program will continue to support the capability established in prior years to perform comprehensive technical and psychological threat credibility assessments. These analyses by a team of highly skilled analysts of actual threat communications serve as a national asset to the Department's Emergency Action and Coordination Team (EACT), the Federal Bureau of Investigation (FBI), and the Nuclear Regulatory Commission (NRC). This capability will also be utilized, as needed, in support of other appropriate Federal, state, and local law enforcement agencies through the FBI. In FY 1987, it is planned to establish a technically "secure" Credibility Assessment Team Communications System (CATCOMS). Threat exercises have identified such a requirement to reduce the vulnerability of crisis communications to interception. The secure CATCOMS would be used as the prime communication channel for crisis management in DOE.

In operational security areas, DOE will continue to support vulnerability assessments of program activities, and will increase activities related to employee security education and hostile intelligence threat awareness; domestic and foreign threat assessments; and the validation of safeguards and security needs as related to line-item construction projects.

Safeguards and Security Technology and Systems Development

The net increase of $2,403,000 in the FY 1987 level of $13,050,000 over the FY 1986 adjusted appropriation of $10,647,000 for technology and systems development reflects an increased emphasis on addressing potential insider threats at DOE facilities. This new emphasis in FY 1987 features three development areas that will contribute to providing insider threat protection at levels consistent with DOE threat guidance and requirements. This shift in emphasis in safeguards technology and systems development to insider threats is reflected by three topical areas: integrated material control systems, supporting physical protection technologies, and improvements in the quality of confirmatory nuclear material accounting.

To provide effective protection against potential insider threats at DOE production and processing operations, integrated nuclear material control systems and concepts will be applied within the confines of DOE nuclear facilities to provide direct detection and deterrence capabilities against actions by malevolent insiders. Systems concepts and technologies will be developed to establish detection networks from existing information systems, such as processing operations, health and safety, and production quality control, and integrating this relevant safeguards information into a timely system of internal controls sensitive to insider attempts of malevolent action. The need for such internal protection systems and consequences of potential threat of sabotage to vital DOE processing and production operations requires additional developmental support in the area of physical protection techniques. Physical protection developments in FY 1987 will emphasize technology and systems development for monitoring and control of authorized personnel movements inside DOE nuclear facilities. In addition, technological developments will provide improvements in tamper-safing and detection, and internal surveillance techniques.

The Department is committed to improvements in the quality of nuclear material accounting at the DOE nuclear processing facilities. In light of potential insider threats, such improvements are needed to confirm the effectiveness operation of internal protection systems and to reduce inventory and shipper-receiver differences to commensurately minimal levels. In FY 1987, improvements will be sought in measurement technology and in "secure" data base management and analysis methods. The results of these developmental efforts are expected to have a significant impact on future upgrading and improvement programs sponsored by DOE outlay programs.

International

The FY 1987 operating expense request of $5,345,000 for International Activities is an increase of $815,000 over the FY 1986 adjusted appropriation of $4,530,000. This amount will permit increased progress on the DOE's two highest priority efforts in this area, with the primary objective to strengthen international safeguards in support of U.S. nonproliferation and national security. There will be increased bilateral cooperation, including new technical exchanges with the United Kingdom and France, and continuing cooperation with EURATOM and other Member States, including exchange of information, staff, and equipment for projects to improve the application of newly developed equipment for international safeguards and physical security of nuclear materials. Research and development will continue on new and improved technology and systems for IAEA safeguards, including increased effort on safeguards for reprocessing plants and continued effort on fuel fabrication plants.

The DOE decision to develop and demonstrate the atomic vapor laser isotope separation (AVLIS) process introduced a new requirement for research and development of international safeguards methods and equipment for use with AVLIS under the U.S.-IAEA treaty agreement for the application of international safeguards in the U.S. The research and development must address the possible impact on the design of AVLIS plant equipment, and must be established early in the development and demonstration phase of the plant equipment. The budget impact of this work is offset by termination of the corresponding development for the Portsmouth Gas Centrifuge Enrichment Plant.

Classification

The Office of Classification is responsible for implementing the DOE's classification and declassification program. The objectives of the program are to establish and implement policy for the classification of Restricted Data, Formerly Restricted Data, and National Security Information within DOE's jurisdiction in accordance with the requirements of the Atomic Energy Act of 1954, as amended, and applicable Executive Orders. The program must also assure the continuous review of Restricted Data in order for the Assistant Secretary for Defense Programs to determine what may be declassified and disseminated in the interest of scientific and technical progress and the general public welfare, without damage to the national security.

Specifically, the program (1) provides continuing guidance and oversight to Headquarters and field organizations on classification and declassification policies and procedures; (2) develops and updates classification guidance for nuclear weapons and other classified areas; (3) handles classification and declassification reviews, such as Freedom of Information Act requests and Mandatory Review requests pursuant to Executive Order 12356; (4) performs appraisals of Headquarters, field office, and contractor classification functions; and (5) conducts classification educational activities at DOE Headquarters.

The FY 1987 budget request includes $2,301,000 for technical programmatic support activities, an increase of $531,000 above the FY 1986 adjusted appropriation of $1,770,000. Programmatic support is required to: (a) develop classification guidance in such areas as advanced nuclear technologies and sensitive nonnuclear technologies; (b) continue development and support for the classification automation system; (c) review sensitive technologies at DOE program offices; (d) improve the classification appraisal program to ensure that more frequent appraisals are conducted at DOE Headquarters and in the field offices; (e) develop a comprehensive education program for management and authorized classifiers in Defense Programs; and (f) enhance quality assurance activities.

Capital Equipment

	FY 1986 Adjusted Appropriation	FY 1987 Request
Capital Equipment....................................	$ 4,455	$ 4,800

The FY 1987 request for capital equipment is an increase of $345,000 above the FY 1986 adjusted appropriation. The request includes such items as confirmatory measurements units, a thermal ionization mass spectrometer, security countermeasures, and computer security test and evaluation equipment, etc.

Construction

	FY 1986 Adjusted Appropriation	FY 1987 Request
Construction....................................	-	$ 1,000

The FY 1987 request supports Project 86-D-106, Nuclear Safeguards Technology Laboratory, Los Alamos, New Mexico, with a total estimated cost of $13,800,000. This project will be a unique center for United States nuclear safeguards development and application. The project provides for centralized instrumentation development laboratories specifically designed for safeguards requirements; urgently needed space for the development, testing, and evaluation of measurement and accountability systems for implementation in DOE nuclear facilities; and facilities to support rapid transfer of advanced safeguards technology to the nuclear community.

At present, the safeguards research and development facilities are not in a security area. Because of this, nuclear materials must be transported from a different site, guarded by armed personnel while in use, and returned to the original site at the end of the working day. The Nuclear Safeguards Technology Laboratory will be a materials access area within a protected area. Thus, during required periods, the daily transportation of special nuclear material over public access roads between an offsite vault and the safeguards laboratories will be virtually reduced to zero.

Operating Expenses - Program Direction

	FY 1986 Adjusted Appropriation	FY 1987 Request
Program Direction....................................	$ 7,252	$ 7,680

The FY 1987 request is $430,000 above the FY 1986 adjusted appropriation. The program direction funds provide for the salaries, benefits, and travel expenses for 133 positions associated with operational and management responsibilities of the safeguards and security and classification programs. This request reflects an increase in personnel compensation, benefits, and travel.

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Space Science Laboratory,
Los Alamos, New Mexico

2. Project Number: 85-D-171

13. Narrative Explanation of Total Project Funding and Other Related Requirements (cont'd)

$3.93/sq. ft. and $4.36/sq. ft. for utility base rate yields a FY 1988 cost of $5.01/sq. ft. for maintenance and janitorial with $6.81/sq. ft. for utilities for a total of $11.82/sq. ft. The product of $11.82 and 21,000, the area of the building, is approximately $250,000.

(2) Programmatic operating expenses directly related to the facility

All personnel operating this facility will be relocated from various sites throughout the Laboratory, therefore there will be no incremental increase in the programmatic operating expenses directly related to this facility.

(3) Capital equipment not related to construction but related to the programmatic effort in the facility.

Approximately $480,000 per year is anticipated.

(4) GPP funding for development laboratory space will be required to sustain the programmatic expansion until the facility comes on line and thereafter.

(5) Other costs are not anticipated.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	Gramm-Rudman-Hollings	Subtotal	Comparability Adjustments	Adjusted Approp. Total
Nuclear Safeguards and Security					
Operating Expenses	$ 54,325	$ -1,655	$ 52,670	$ -72	$ 52,598
Capital Equipment	4,600	-145	4,455	-	4,455
Construction	-	-	-	-	-
Total, Nuclear Safeguards and Security	$ 58,925	$ -1,800	$ 57,125	$ -72	$ 57,053

The following table is a detailed breakdown of the Nuclear Safeguards and Security program direction Budget:

	FY 1986 Adjusted Appropriation	FY 1987 Request
Personnel Services and Benefits		
Personnel Compensation	$ 6,354	$ 6,560
Personnel Benefits	695	721
Subtotal	7,049	7,281
Contractual Services and Supplies		
Travel	202	400
Printing and Reproduction	2	2
Subtotal	204	402
Total Program Direction	$ 7,253	$ 7,683

The safeguards and security staff is charged with the following major programmatic areas of responsibility:

- Policy development and implementation, long-range planning, followup action on the resolution of identified site deficiencies, and resource management activities of the Office of Safeguards and Security.

- Oversight assessment of the effectiveness and implementation of safeguards and security policy as it relates to the protection of nuclear-related DOE responsibilities and other designated DOE activities.

- Operational aspects of personnel clearance procedures, actions and policy, as well as the management of the DOE's personnel security clearance program involving the processing and analysis of approximately 31,000 security investigations per year.

- Direction and coordination of Department-wide physical, technical, computer, and operational security programs, as well as document control and protective personnel programs.

- Direction of the technology activities in physical protection and material control and accounting, for international safeguards, and for operational aspects of nuclear material control and accounting.

- Management of the United States "Program of Technical Assistance to International Atomic Energy Agency Safeguards," a reimbursable work program funded at more than $5,000,000 per year from Department of State appropriated funds.

The classification staff is charged with the following major areas of responsibility:

- Technical direction and management of the Classification program; development, issuance and monitoring of classification guides, bulletins, policies and procedures; classification reviews of documents and materials for the public (e.g., Freedom of Information Act and Mandatory Review Requests), other Department elements, other Federal agencies and foreign governments; classification support for congressional activities (testimony and review); development and implementation of a classification education program; and development and maintenance of data management systems on classification reviews, guides, and authorized classifiers.

The nature of the activities supported on this budget do not lend themselves to the traditional cost-benefit analysis. However, activities are conducted in a manner to assure the most effective and efficient use of program resources.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
Construction Project Data Sheet
Atomic Energy Defense Activities - Plant and Capital Equipment
Nuclear Safeguards and Security
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Nuclear safeguards technology laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-186

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3. Date A-E Work Initiated: 1st Qtr. FY 1987

3a. Date Physical Construction Begins: 1st Qtr. FY 1988

4. Date Construction Ends: 4th Qtr. FY 1989

5. Previous Cost Estimate: $10,600
Date: September 1985

6. Current Cost Estimate: $10,600
Date: January 1986

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7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 1,000	$ 1,000	$ 1,000	$ 900
1988	7,000	7,000	7,000	5,400
1989	2,600	2,600	2,600	4,300

8. Brief Physical Description of Project

The Nuclear Safeguards Technology Laboratory (NSTL) will be a unique center for US nuclear safeguards development and application. Los Alamos National Laboratory is responsible for a broad range of advanced safeguards technology and is the lead DOE laboratory for nuclear materials measurement and accountability. The latter emphasizes nondestructive assay (NDA) instrumentation development, safeguards systems analyses, computer-controlled accountability systems development, and the rapid transfer and early implementation of this advanced technology to both the domestic and international nuclear communities. The NSTL will be the center of these activities. It will accommodate approximately 70 people and will consolidate elements of the Nuclear Safeguards Research and Development programs at Los Alamos, which are vital to the development and transfer of safeguards measurement and accounting technology.

The project conforms to the Laboratory Long-Range Site Development Plan and is part of the Five-Year Implementation Plan.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
Construction Project Data Sheet
Atomic Energy Defense Activities - Plant and Capital Equipment
Nuclear Safeguards and Security
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Nuclear safeguards technology laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-186

2. Brief Physical Description of Project (cont)

This facility will consist of a two-story building of approximately 36,800 square feet, including space and provisions for accommodating safeguards training courses that are sometimes attended by uncleared personnel and foreign nationals. It will contain NDA instrument development laboratories, training laboratories, a seminar facility, offices, computer facilities, a conference area, a machine shop, a Category I Special Nuclear Material (SNM) vault, a computer development lab, a controlled testing lab, storage areas, an access shaft and tunnel, and support facilities.

The NSTL will be a Materials Access Area (MAA), and the area surrounding the building will be included in a protected area (PA). However, the building is designed to facilitate removal of the Safeguards Training Lab and Auditorium from the security area when required for training of uncleared citizens and foreign nationals. Under this arrangement, however, the NSTL will not be subject to public access at any time.

The building will employ a structural space frame system of construction using the most cost-effective materials available to allow the maximum open area and flexibility. A minimal-maintenance building envelope will be used for the exterior finish. The interior design will utilize flexible office and laboratory systems for the most efficient use of space, and access floors to provide maximum flexibility for data distribution, communication, power, and mechanical systems.

Programmed office space for this facility requires an average net area of approximately 64 square feet per person.

The building was re-sited from TA-35 to TA-55 because of security requirements that resulted in the incorporation of a security access shaft, tunnel, elevator, and basement corridor and adjustments to the new site geography.

Site work will include appropriate vehicular access, sidewalks, curbs and gutters, landscaping, drainage, and erosion control. Staff, government, service, and visitor vehicular access will be over a paved road to Pecos Drive. Parking will be provided for 80 vehicles. Utilities will include relatively short service hook-ups for electrical power, telephone, water, and natural gas. A sewage lift station and force main will be required to tie into the existing sanitary sewer. Access to the site will be controlled by a security guard station and the extension of the existing TA-55 perimeter security system.

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FY 1987 CONGRESSIONAL BUDGET REQUEST
Construction Project Data Sheet
Atomic Energy Defense Activities - Plant and Capital Equipment
Nuclear Safeguards and Security
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Nuclear safeguards technology laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-186

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8. Brief Physical Description of Project (cont)

As this project is located in an area that is not served by one of the existing central energy systems, it will have a natural-gas-fired hot water boiler, which can be readily modified to interface with more efficient future central energy distribution systems.

The overall energy consumption of this facility will be minimized with energy conservation considerations, including insulation, building orientation, passive solar features, heat recovery, economy-cycle cooling, night and weekend setback/shutdown, and energy-efficient electrical and mechanical systems.

Energy conservation features and systems will be integrated into the preliminary design (Title I) in accordance with the General Design Criteria Manual, DOE 6430.1.

Summer temperatures and humidity control will be provided for the computer rooms, laboratories, darkrooms, lecture and conference rooms, and auditorium by mechanical refrigeration. Evaporative cooling will provide summer temperature control for the offices. Mechanical ventilation will be provided for the shop, equipment rooms, and rest rooms. Soldering hoods will be required for the machine shop. An absolute filtration and exhaust system will be provided for the laboratory glove box.

Power will be distributed throughout the building at 208Y/120 volts and 480Y/120 volts. The building will be equipped with a telephone system, a protected wireline, and an intrusion detection system. Fire protection will be provided by a hydraulically designed wet pipe sprinkler. Plumbing and piping systems will consist of heating hot water, potable hot and cold water, industrial hot and cold water, sanitary sewer, roof drain, compressed air, natural gas, and circulating cooling water.

Standard equipment will include office and laboratory furnishings, machine shop equipment, computer terminals, dark room equipment, audio/visual equipment, and auditorium, dining, reception and library furnishings.

The requested FY 1987 funding will be used for Title I and Title II design of the building.

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(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Nuclear safeguards technology laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-186

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9. Purpose, Justification of Need for, and Scope of Project

The purpose of this project is to provide a new facility that will significantly reduce the transportation of Special Nuclear Material (SNM) between sites, thereby improving the security of SNM at the Laboratory, and will minimize creation of temporary material access areas in current facilities. It will provide space in a secure area for safeguards system design and analyses, the results of which often are classified. This facility will provide centralized instrumentation development laboratories specifically designed for safeguards requirements, urgently needed space for the development, testing, and evaluation of measurement and accountability systems for implementation in DOE nuclear facilities, and facilities to support rapid transfer of advanced safeguards technology to the nuclear community and the International Atomic Energy Agency (IAEA). The facility will consolidate principal activities of the Nuclear Safeguards Research and Development programs at the Los Alamos National Laboratory and will alleviate conditions of wide dispersion, overcrowding, and deterioration.

The widespread use of nuclear materials requires the development of systems to: (1) safeguard against terrorist nuclear threat and blackmail; (2) provide nuclear materials accountability by perfecting fail-safe methods to track and inventory SNM; and (3) enhance the nuclear community's ability to control and respond to nuclear problems worldwide. The Los Alamos National Laboratory is responsible for a broad range of advanced safeguards technology and is the lead DOE laboratory for nuclear materials measurement and accountability. The latter emphasizes nondestructive assay instrumentation development, safeguards systems analyses, computer-controlled accountability systems development, and the rapid transfer and early implementation of this advanced technology to both the domestic and international nuclear communities. The NSTL will be the center of these activities and will provide:

a. centralized instrumentation development laboratory facilities that are specifically designed for safeguards requirements;

b. space for the development, testing, and evaluation of measurement and accountability systems for implementation in DOE nuclear facilities; and

c. facilities to support our responsibilities for speedy and effective transfer of advanced safeguards technology to the nuclear community.

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Atomic Energy Defense Activities - Plant and Capital Equipment
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(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Nuclear safeguards technology laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-186

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9. Purpose, Justification of Need for, and Scope of Project (cont)

The NSTL will be sited at TA-55, the Plutonium Processing Facility site, and near the existing safeguards locations. The proximity of these facilities will enhance ongoing safeguards research, development, test, and evaluation (RDT&E), including the continuing activities at the Plutonium Processing Facility and the demonstration of its accountability system to Defense Programs organizations.

The principal activities of the Los Alamos Safeguards Program, which is sponsored almost entirely by the DOE, include the following: (1) RDT&E of advanced measurement and accounting systems for rapid control and inventory of nuclear materials in DOE nuclear facilities; (2) implementation of such systems in existing and planned DOE nuclear facilities; (3) development of high-sensitivity detection and identification instruments; (4) response to local measurement needs of the Office of Military Application's special materials projects, and assistance in safeguards as required by DOE Order 5630.2; (5) development of measurement instrumentation and safeguards systems analyses for international safeguards, under the DOE-managed Program of Technical Assistance (POTAS) to the IAEA; and (6) the operation of the Safeguards Technology Training Program for the DOE. For the past 4 years, Los Alamos also has conducted training courses in States' Systems of Accounting and Control for the DOE and the IAEA, under the mandate of the Nuclear Non-Proliferation Act of 1978.

The United States is committed, through the State Department, the President, and the Congress, to support the IAEA in personnel exchanges, technology exchanges, and inspector training. Because the IAEA inspection staff is drawn from member states (some of which are Soviet Bloc) with different political views and security interests from those of the United States, it is not possible to allow unlimited access of the inspectors into actual United States operating nuclear facilities to receive technical training using United States nuclear materials. Therefore, it is necessary for the United States, in its continuing efforts to support the IAEA, to maintain a facility that can be used to access control these IAEA inspectors without allowing the potential compromise of classified information or access to sensitive nuclear materials.

The NSTL will provide the requisite facility, properly protected to meet the DOE requirements, which can be used as a controlled training laboratory for these IAEA inspectors and would allow the United States Government to meet its commitments to the Department of State, the President, the Congress, and the IAEA. Although the NSTL will be an MAA and the area surrounding the building will be a PA, the building is designed to permit removal of the Safeguards Training Lab and

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1. Title and Location of Project: Nuclear Safeguards Technology
Laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-105

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3. Purpose, Justification of Need for, and Scope of Project (cont)

Auditorium from the security area when required for training of IAEA personnel. Under this arrangement, however, the NSTL will not be subject to public access at any time.

Recent events have focused national attention on the importance of nuclear safeguards and the urgency of improving the capability of safeguards systems throughout the DOE nuclear facilities. The Los Alamos Safeguards Program is responsible for developing, testing, and implementing advanced measurement and accountability systems at several DOE facilities now under construction (for example, the Naval Fuel Materials Facility and the New Special Recovery Facility at Savannah River) as well as nearly all currently operating DOE facilities. With the anticipated future construction of both uranium and plutonium Laser Isotope Separation (LIS) enrichment facilities as well as increased emphasis on improved safeguards in existing DOE facilities, the need for such support to DOE facilities and the nuclear community at large will continue to grow throughout the foreseeable future. The associated RDT&E requires large amounts of contiguous development laboratory space not now available; current efforts are fragmented and distributed over a collection of inadequate, makeshift labs. The NSTL will permit consolidation of these urgently needed systems development activities.

The Safeguards Training Program, which is the principal means for rapid transfer of measurement and accounting technology to the nuclear community, is especially hampered by the lack of adequate training laboratories. Most courses require "hands-on" instrumentation laboratory training, which is accomplished by breaking the classes into small laboratory groups. To accommodate the several groups, staff offices are converted on a temporary basis to training laboratories, which is wasteful and inconvenient for the personnel involved.

Portions of the Safeguards Technology Training Program activities and other technology transfer functions must be in areas accessible to uncleared domestic, foreign and IAEA visitors. As many as 250 persons attend the training courses each year, and a comparable number of persons come at various times to discuss and learn about the specific areas of safeguards technology.

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1. Title and Location of Project: Nuclear safeguards technology laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-186

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9. Purpose, Justification of Need for, and Scope of Project (cont)

The NSTL can help solve this problem and allow the possibility of including selected space to be enclosed in a security area. Locating a portion of the facilities at TA-55 in a security area would allow the program to accommodate changes in classification guidance.

Personnel in the program currently number about 300 spread throughout numerous buildings and trailers in 2 technical areas separated by 4 miles. Approximately one-half are located at Ten Site (TA-35) in Building 27, a structure originally built to house a test reactor and not suited for office and/or laboratory space. Others are located in parts of Building 2 and in three trailers and two transportable buildings at TA-35. Other organizations housed in Building 2 include parts of P (Physics), CHM (Chemistry), MST (Materials Science and Technology) and LS (Life Sciences) Divisions, with the Safeguards Program occupying approximately 20% of the usable building area.

Current "maximum packing" in the available assortment of ill-suited space, reactor pits, accelerator bays, and trailers is detrimental to both morale and productivity of the Los Alamos Safeguards Program. Furthermore, some of this space, such as the high-bay area in Building 27, TA-35, which is equipped with a 50-ton bridge crane, was modified to alleviate acute safeguards space problems at the sacrifice of its special capability. The NSTL will allow this capital-intensive space to be made available for more efficient use by the Laboratory.

The possibility of obtaining additional space in TA-35 facilities has been explored. This site is shared with another major program, laser fusion, which also ranks high in national priorities. The Laser Program, like Safeguards, has increased its personnel levels and has constructed a new, large, high-energy facility and a target fabrication facility on this site. In short, virtually all existing space at TA-35 is committed.

Consideration has been given to moving a portion of the safeguards staff to another site, if suitable space be came available. Such a move would further fragment safeguards staff and be detrimental to the overall programmatic effort; furthermore, no suitable space has become available or can be expected.

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1. Title and Location of Project: Nuclear safeguards technology laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-186

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9. Purpose, Justification of Need for, and Scope of Project (cont)

The short-term space deficits will continue to be met by the lease of office trailers located in the vicinity of Buildings 2 and 27 at TA-35. This action must be considered as a temporary remedy, since it does not provide needed laboratory space, further scatters the safeguards staff, and in no way alleviates the existing inefficient conditions.

The NSTL construction project is the best and, at this time, the only available solution to the acute and deteriorating space problem that has existed for more than 5 years for the Los Alamos Safeguards Program.

During this period, the marked growth in both program scope and personnel was accommodated by trailers and temporary structures, resulting in an undesirable mix of laboratory and office areas and overcrowded work areas.

Without funding for this construction project, these extremely important safeguards programs will continue to be adversely affected. The requested facility will eliminate conditions of wide dispersion, overcrowding, and deterioration; reduce the transportation of SNM between sites; and provide necessary unclassified and classified facilities.

This project will allow consolidation of two security areas. In addition, the SNM used in this area will not be exposed to public access roads because of reduced intrasite shipments.

DEPARTMENT OF ENERGY
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Construction Project Data Sheet
Atomic Energy Defense Activities - Plant and Capital Equipment
Nuclear Safeguards and Security
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Nuclear safeguards technology laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-186

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10. Details of Cost Estimate*

a. Engineering, design, and inspection based on 16% of constructions costs**		$ 1,120
b. Construction Costs		7,050
(1) Improvements to land, including general site work, security fence, roads, parking, walks, and landscaping	$ 845	
(2) Building: Laboratory-Office building, 36,800 sq. ft. at approximately $147/sq.ft.	5,420	
(3) Other Structures - tunnel and entrance	625	
(4) Special Facilities	0	
(5) Utilities, including fire and potable water service, sanitary sewer, natural gas, electrical power, and data and communications service lines	160	
c. Standard Equipment - laboratory and office furnishings		880
Subtotal		9,050
d. Contingency at approximately 17% of above costs***		1,550
Total project cost		$10,600

* The estimate is based on a conceptual design that is complete. The Laboratory is using escalation rates of 4.9% for CY 1985, 6.4% for CY 1986, 6.7% for CY 1987, 6.5% for CY 1988, and 6.9% for CY 1989. These rates were forecasted using "Data Resources Incorporated" forecasting services. These services were contracted by the DOE.

** Cost-of-services were estimated for engineering, design, and inspection from historical records and experience with manhour requirements established for each discipline.

*** Contingencies were analyzed and applied to items based on the uncertainties of the development at the conceptual level.

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1. Title and Location of Project: Nuclear safeguards technology laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-186

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11. Methods of Performance

Design and inspection will be performed under a negotiated architect-engineer contract. Project management and engineering support will be provided by the operating contractor. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total Project Funding					
(1) Total Facility Costs					
(a) Construction Line Item...........	$ 0	$ 900	$ 5,400	$ 4,300	$10,600
(b) P E & D..........................	0	0	0	0	0
(c) Expense Funded Equipment.........	0	0	0	0	0
(d) Inventories......................	0	0	0	0	0
Total Facility Costs...........	$ 0	$ 900	$ 5,400	$ 4,300	$10,600
(2) Other Project Funding					
(a) Conceptual Design................	$ 190	$ 0	$ 0	$ 0	$ 190
(b) Other Project-Related Costs......	0	0	0	0	0
Total Other Project Funding....	$ 190	$ 0	$ 0	$ 0	$ 190
Total Project Funding............ (Item 1 and Item 2)	$ 190	$ 900	$ 5,400	$ 4,300	$10,790

b. Total Related Funding Requirements (Estimated Life of Project: 25 years)

(1) Facility Operating Costs..	$ 466
(2) Programmatic Operating Expenses Directly Related to the Facility.........................	0
(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility..	0
(4) GPP or Other Construction Related to Programmatic Effort in the Facility..............	0
(5) Other Costs..	0
Total Other Related Annual Funding Requirements..	$ 466

DEPARTMENT OF ENERGY
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Nuclear Safeguards and Security
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Nuclear safeguards technology laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-186

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13. Narrative Explanation of Total Project Funding and Other Related Requirements

a. Total Project Funding

(1) Total facility costs. No narrative is required.

(2) Other project funding.

(a) Conceptual design costs. No R&D will be required.

(b) No other project-related funding will be requested.

b. Total Related Funding Requirements

(1) Facility operating costs.

This category includes maintenance, janitorial, and utilities calculated from FY 1984 costs on a per-square-foot basis throughout the Laboratory and projected to FY 1990. Five percent escalation per year for FY 1985, ten percent escalation for FY 1986, seven percent escalation per year for FY 1987, five percent escalation for FY 1988, and seven point five percent escalation for 1989 was used on maintenance and janitorial base costs, and ten point five percent escalation per year for FY 1985, FY 1986, FY 1987, FY 1988, and FY 1989 was used for utilities. This procedure yields an FY 1990 maintenance cost of $3.49/sq.ft., a janitorial cost of $1.99/sq.ft., and a utilities cost of $7.18/sq.ft. for a total of $12.66/sq.ft./yr. The product of $12.66 and 36,800 square feet, the area of the building, is approximately $466,000.

(2) Programmatic operating expenses directly related to the facility.

All personnel operating this facility will be relocated from various sites throughout the Laboratory, therefore, there will be no incremental increase in the programmatic operating expenses directly related to this facility.

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(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Nuclear safeguards technology laboratory, Los Alamos, New Mexico

2. Project Number: 86-D-105

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13. Narrative Explanation of Total Project Funding and Other Related Requirements (cont)

(3) Capital equipment not related to construction but related to the programmatic effort in the facility.

None anticipated.

(4) GPP or other construction related to programmatic effort.

None anticipated.

(5) Other costs.

None anticipated.

14. Incorporation of Fallout Shelters

Fallout shelter space will not be provided under this project as there is sufficient space in Los Alamos to accommodate the population.

15. Federal Compliance with Pollution Control Standards

The total cost of this project includes the costs of these measures necessary to assure compliance with Executive Order 12088. Sanitary wastes will be discharged to an existing sanitary sewer that is connected to adequate sewage treatment facilities. Where potential airborne contaminants exist, ventilation and process air leaving the building are subjected to filtration to give maximum practicable reduction in quantities emitted and to provide emissions below applicable standards. Contaminated waterborne waste will be disposed of at the Laboratory contaminated waste treatment facility.

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(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Nuclear Safeguards Technology Laboratory, Los Alamos, New Mexico

2. Project Number: [illegible]

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16. Evaluation of Flood Hazards

The components of this project are located in an area not subject to flooding, as determined in accordance with Executive Order 11988.

17. Environmental Impact

Information on this proposed project and pertinent environmental factors were submitted to DOE Headquarters on April [illegible], 1985, in the form of an action description document. This information is provided for Headquarters use in determining the need for further documentation.

This proposed construction project will not be located in a floodplain or wetland, and no wetland assessment is required.

18. Accessibility for the Handicapped

The total cost of this project includes the cost of construction necessary to make the new facility accessible to the handicapped, in accordance with the Architectural Barriers Act Public Law 90-480, and the implementing regulations in the Federal Property Management Regulations (41CFR101-19.6). The proposed facility will not be accessible to the public. Provisions will be made for handicapped employees to use the proposed facilities.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
SECURITY INVESTIGATIONS
ATOMIC ENERGY DEFENSE ACTIVITIES
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request Vs. Base
Security Investigations (OP)					
Operating Expenses..........	$34,000	$32,200	$32,200	$33,300	$+1,100
Security Investigations..........	$34,000	$32,200 a/b/	$32,200	$33,300	$+1,100
Staffing Total FTE's..........	N/A	N/A	N/A	N/A	N/A

a/ Reflects a general reduction of $200,000.

b/ Reflects $1,300,000 sequestered to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (P.L. 99-177).

Authorization: Section 91, P.L. 95-91

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
Security Investigations

(Tabular dollars in thousands. Narrative material in whole dollars.)

FY 1986 Adjusted Appropriation/FY 1987 Base	$ 32,200
OPM increased by approximately 443 cases from FY 1986 @ $1,625	+ 720
FBI increased by approximately 200 cases from FY 1986 @ $1,850	+ 371
NAC increased by approximately 900 cases @ $10	+ 9
FY 1987 Request	$ 33,300

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
Security Investigations

(Tabular dollars in thousands. Narrative material in whole dollars.)

Program Overview

The objective of the Security Investigations Program is to insure that the common defense and security of the United States will not be endangered by the granting of security clearances to DOE and DOE contractor personnel who, in the performance of their work, must have access to Restricted Data, National Security Information, or Special Nuclear Material, or who occupy a designated Critical Sensitive position.

Recent clearance support has been sufficient to provide for DOE and contractor needs. Approximately 30,764 security investigations will be performed in FY 1987, an increase of 1,542 investigations above FY 1986.

Justification

The FY 1987 request for the Security Investigations Program is $33,300,000, an increase of $1,100,000 above the FY 1986 adjusted appropriation. This amount will provide DOE with approximately 30,764 security investigations (20,164 Full-Field Background Investigations and 10,600 National Agency Checks). The estimated cost for a Federal Bureau of Investigation Full-Field Background Investigation is $1,850, no change from FY 1986. The estimated cost of the Office of Personnel Management investigation is $1,625, no change from the FY 1986 estimate. The $33,300,000 should adequately support projected FY 1987 requirements for all DOE and DOE contractor personnel requiring security clearances.

A tabulation of programmatic areas that are supported and the FY 1986 and FY 1987 funding levels follows:

	FY 1986 Adjusted Appropriation		FY 1987 Request	
	Cases	Amount	Cases	Amount
Programs				
Defense Program Activities........	21,328	$24,705	21,715	$24,833
Other DOE Activities				
Uranium Enrichment............	4,147	4,652	3,475	3,908
Nuclear Energy................	3,279	2,259	4,392	3,515
Other.........................	468	584	1,182	1,044
Total Other DOE...........	7,894	7,495	9,049	8,467
Total.................	29,222	$32,200	30,764	$33,300

Below is a summary tabulation of security clearance requirements for FY 1986 and FY 1987:

	FY 1986 Adjusted Request		FY 1987 Request	
	Full Field	NAC	Full Field	NAC
Programs				
Defense Program Activities.......	14,949	6,379	15,001	6,714
Other DOE Activities				
Uranium Enrichment...........	2,852	1,295	2,396	1,079
Nuclear Energy...............	1,366	1,913	2,131	2,261
Other........................	355	113	636	546
Total Other DOE..........	4,573	3,321	5,163	3,886
Total................	19,522	9,700	20,164	10,600

The Atomic Energy Act of 1954, as amended, and Executive Orders 10450 and 10865 require that background investigations be conducted on all persons prior to being granted access to classified information, material, facilities or special nuclear material. Such investigations must be conducted by either the Federal Bureau of Investigation or the Office of Personnel Management.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
NAVAL REACTORS DEVELOPMENT

ATOMIC ENERGY DEFENSE ACTIVITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Plant Development					
Operating Expenses ..	$ 62,300	$ 62,500	$ 62,500	$ 71,000	$+ 8,500
Subtotal	62,300	62,500	62,500	71,000	+ 8,500
Reactor Development					
Operating Expenses ..	229,300	251,700	251,700	274,000	+22,300
Capital Equipment ..	22,500	25,300	25,300	51,700	+26,400
Construction	48,000	46,270	46,270	12,100	-34,170
Subtotal	299,800	323,270	323,270	337,800	+14,530
Reactor Operation and Evaluation					
Operating Expenses ..	122,000	139,000	139,000	173,000	+34,000
Subtotal	122,000	139,000	139,000	173,000	+34,000
Program Direction					
Operating Expenses...	11,200	10,923[b]	10,923	11,800	+ 877
Subtotal	11,200	10,923	10,923	11,800	+ 877
Total					
Operating Expenses...	424,800	464,123	464,123	529,800	+65,677
Capital Equipment....	22,500	25,300	25,300	51,700	+26,400
Construction	48,000	46,270	46,270	12,100	-34,170
Total Naval Reactors Development	$495,300[a]	$ 535,693[c]	$535,693[c]	$593,600	+57,907
Staffing Total FTE's...	194	213	213	213	-

Authorization: Section 31, P.L. 83-703

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[a] Reflects a management initiative reduction of $1,600,000.

[b] Reflects proposed appropriation transfer of $166,000 to Departmental Administration for general FTE clerical reductions.

[c] Reflects $27,641,000 sequestured to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (P. L. 99-177).

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
ATOMIC ENERGY DEFENSE ACTIVITIES
NAVAL REACTORS DEVELOPMENT
(In thousands of dollars)

FY 1986 Adjusted Appropriation/FY 1987 Base	$535,693
Plant Development	
- Escalation and facility decontamination	+ 8,500
Reactor Development	
- Escalation, INEL Advanced Test Reactor beryllium shield and fuel requirements, and Advanced Fleet Reactor work, offset by the net change in plant and equipment category - an increase in capital funds for prototype plant and data processing equipment and a decrease in construction funds as FY 1986 was the last year for funding the fuel factory, prototype modifications, and ATR reactor modifications projects	+14,530
Reactor Operation and Evaluation	
- Escalation and increase in the number of prototype plants requiring service	+34,000
Program Direction	
- Escalation and other expenses	+ 877
FY 1987 BUDGET REQUEST	$593,600

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST

PROGRAM OVERVIEW
Naval Reactors Development

I. Program Overview

For Fiscal Year 1987 the Naval Reactors Development budget request is $[illegible] million. These funds provide for continuing the work in the areas described below. The $[illegible] million increase over the Fiscal Year 1986 adjusted appropriation consists of escalation, additional prototype plants requiring service, [illegible] Test Reactor [illegible] changeout and fuel requirements, and Advanced Fleet Reactor work.

Over 40 percent of the Navy's combatant vessels are nuclear powered, including the ballistic missile submarines which constitute the most survivable leg in the strategic defense triad, attack submarines which provide the most viable threat against the submarine nuclear threat of potential adversaries, and aircraft carriers and cruisers which provide unparalleled power projection capabilities. Nuclear propulsion provides operational flexibility not possible with fossil fueled ships.

The purpose of the Naval Reactors Development effort is to develop naval nuclear reactor plants and cores which will improve the performance and promote safe operation of these ships, both now and in the future. The objective is to couple enhanced performance with simplified plant operating and maintenance requirements and improved plant safety and reliability.

Nuclear reactor plant advances are sought in power density, lifetime, and survivability. Development of high power reactor plants allows increased ship performance. Reducing propulsion plant weight has the added benefit of reducing volume necessary for housing in a submarine. Additionally, improved power increases the ability to alter ship speeds quickly over wide ranges thus providing a tactical advantage. Reducing the noise generated by a reactor plant is essential to reducing the detectability of a submarine. Ruggedness, toughness and, for submarines, quietness are keys to enhancing a warship's combat effectiveness. Longer life reactors require fewer refuelings thus reducing costs, generating less radioactive waste material, and increasing ship availability for fleet [illegible] duty.

As the number and average age of nuclear powered warships continues to grow, additional effort is given to improving operating plants. Work is necessary to assess and evaluate material and nuclear performance, ensure safety, understand and deal with long term phenomena, and to develop improved cores and components. Operating data obtained from equipment in the fleet is a valuable data source for new development.

Major work includes: the Advanced Fleet Reactor which will concentrate many of the current advances in reactor concepts, components and materials to power the new [illegible] class of nuclear powered attack submarines; a Modified Fuel Process for use in producing advanced fuel elements which will allow further flexibility in core and fuel design to increase reactor power and endurance; and a Developmental Materials Core to test and evaluate new materials [illegible] under prototypic conditions. Other ongoing development efforts will continue, including development and testing of advanced materials for use in reactor plant components, systems and cores; production processes and techniques capable of efficiently and consistently manufacturing advanced materials and components; new plant, components, and systems concepts; and advanced analytic techniques to facilitate investigation and analysis of future and existing cores and components.

New designs and components undergo extensive testing before and during fleet application. Operation of eight land based nuclear prototype plants and the Advanced Test Reactor provides long term testing of materials, components and cores and empirical data on plant performance ahead of fleet experience, allowing for identification and resolution of any problems before they are encountered in the fleet. These plants are

[illegible]

1. [illegible]

	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

2. [illegible]

[illegible]

[illegible]

[illegible]

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	General Reduction	Gramm-Rudman-Hollings	Subtotal	Comparability Adjustments	Adjusted Approp. Total
Security Investigations (DP)						
Operating Expenses	$ 33,400	$ -200	$-1,000	$ 32,200	$ -	$ 32,200
General Reduction	-200	+200	-	-	-	-
Total, Security Investigations	$ 33,200	$ 0	$-1,000	$ 32,200	$ -	$ 32,200

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	FTE General Reduction	Gramm-Rudman-Hollings	Subtotal	Comparability Adjustments	Adjusted Approp. Total
Naval Reactors Development (NE)						
Plant Development						
Operating Expenses	$ 66,000	$ -	$ -3,500	$ 62,500	$ -	$ 62,500
Subtotal	66,000	-	-3,500	62,500	-	62,500
Reactor Development						
Operating Expenses	261,300	-	-9,600	251,700	-	251,700
Construction	46,500	-	-230	46,270	-	46,270
Subtotal	307,800	-	-9,830	297,970	-	297,970
Reactor Operation and Evaluation						
Operating Expenses	150,000	-	-11,000	139,000	-	139,000
Subtotal	150,000	-	-11,000	139,000	-	139,000
Capital Equipment	28,000	-	-2,700	25,300	-	25,300
Subtotal	28,000	-	-2,700	25,300	-	25,300
Program Direction	11,700	-166	-611	10,923	-	10,923
Subtotal, Naval Reactors Dev.	563,500	-166	-27,641	535,693	-	535,693
Total, Naval Reactors Development	$ 563,500	$ -166	$-27,641	$ 535,693	$ -	$ 535,693
Operating Expenses	489,000	-166	-24,711	464,123	-	464,123
Capital Equipment	28,000	-	-2,700	25,300	-	25,300
Construction	46,500	-	-230	46,270	-	46,270

Examination of expended cores and other irradiated materials will continue during FY 1987, with specific work including: (1) disassembly and examination of fuel, cladding, and structural materials to obtain information on material properties with respect to radiation, corrosion and wear; (2) examination of expended cores to evaluate performance and post-operational core component condition; (3) determination of fuel depletion rates; (4) disposition of prototype cores; and (5) examination and testing of control rod drive mechanisms to confirm condition after reactor operation.

b. Material Development

Improving material performance is an integral step in achieving the Program's objective of enhancing reactor plant performance, longevity, reliability, and safety. Work under Material Development includes development of high integrity nuclear fuels, poisons, cladding, and structural materials capable of achieving desired reactor plant performance.

Material Development begins with research into new materials. Materials demonstrating desirable characteristics are produced with pilot-scale laboratory processes to determine production viability. Laboratory specimens are irradiated in the Advanced Test Reactor and are then examined for dimensional change, structural integrity and corrosion properties. The most promising materials are then used in prototype cores and fully tested in reactor plants. Data on fuel and poison material properties obtained from irradiation and prototype tests are incorporated into design specifications and guidelines to ensure future core designs accommodate and take advantage of material behavior properties. Development of a number of reactor plant materials often proceeds in parallel to realize maximum plant performance gains.

Irradiation testing is a vital portion of the material development effort. Laboratory analysis and limited testing will predict material response to various operating stimuli, however only in an operating reactor can these predictions be verified. The Advanced Test Reactor in Idaho has a number of independently variable test loops which allow irradiation testing of a number of different materials under a variety of temperature and radiation conditions, thus allowing rigorous examination to select the most advantageous materials to commit to long term comprehensive testing in prototype cores.

Material process development is an important area. Performance gains in existing materials can sometimes be achieved through improved production processes, while the acceptability of a new material for use in naval reactors is dependent upon the cost and feasiblity of full scale production. Material process development involves translating laboratory manufacturing techniques and processes into full scale production methods.

Existing materials are continuously evaluated and tested to confirm design assumptions and to understand emergent problems. These evaluations provide considerable amounts of information regarding the actual operational performance of materials over long periods of time. Data gained from these examinations are factored into material development programs, production methods, design specifications and reactor plant operating procedures.

Sophisticated modeling and analysis techniques are used during material development, qualification and testing. These techniques allow prediction of material performance, and are used to establish reactor performance limits.

During Fiscal Year 1987 Naval Reactors will: (1) select an advanced fuel element manufacturing process for irradiation qualification and vendor development; (2) develop, test, and evaluate new and current fuel, poison, cladding, and core structural materials; (3) provide technical guidance to reactor core and component suppliers; (4) continue to develop and qualify new material models and fuel system analysis methods; and (5) define the material properties of advanced cladding materials to provide a database for use in naval nuclear design.

c. Nuclear Design and Analysis

Nuclear Design and Analysis work provides for research and development in the fields of reactor physics, nuclear design and fuel loading of improved reactor cores, and analysis and testing of operating reactors. Naval Reactors also performs reactor shielding design and analysis work, safety analyses of reactor plants and development of improved fuel handling techniques under this portion of Reactor Development.

The ultimate objective of physics design and analysis of naval reactor cores is to develop core designs which meet all operational requirements while optimizing core depletion rates and minimizing adverse material conditions in the reactor. The performance of a reactor core depends on a multitude of factors. Understanding the relationships between these various factors and core performance is therefore crucial to predicting a reactor's operating parameters and the potential limits of its performance.

The work begins with development of analytic models based on research and operating experience. The models are simulated via computer programs and confirmed by test data and data from operating plants. Detailed critical experiments mock up and test advanced core fuel and poison compositions and core geometries. These experimental data are used to establish core fuel and poison loadings and performance predictions. Operating data confirms analytic methods and is used to evaluate performance of the core with respect to design parameters.

During Fiscal Year 1987, Naval Reactors will: (1) complete nuclear engineering for D2W Modified Fuel Process core production; (2) perform physics analysis for the Submarine Test Core acceptance test; (3) continue Advanced Fleet Reactor (AFR) experiments and analyze AFR experiments; (4) analyze advanced reactor concepts for potential shipboard application; and (5) develop and qualify more accurate and efficient procedures and techniques to support physics and nuclear design work.

Reactor plant shielding is an important factor in controlling radiation and in overall plant weight. Work in this area includes: shield surveys of operating plants to ensure that radiation levels are within design specifications and guidelines; and developing, testing, and certifying improved, lighter weight shielding designs and materials.

During FY 1987, Naval Reactors will: (1) provide radiation level evaluations and shield design support for existing and new refueling equipment; (2) evaluate the use of new shielding materials for prototype application; (3) develop a conceptual shield design compatible with the Advanced Fleet Reactor plant and determine shield design modifications to accommodate the Advanced Fleet Reactor in an operating prototype; and (4) continue to evaluate and qualify new methods and data base information to maintain state-of-the-art shield design technology.

The safety analysis effort is a key factor in ensuring safe operation of existing reactor plants and proper design of those on the drawing board. Work in this area involves developing computer codes that predict reactor conditions during and after postulated reactor plant accidents. Results are analyzed and aid in the development of improved equipment and procedures. This analysis is also used to characterize current reactor plant conditions. Based on operating histories, key plant parameters are established and form the basis for future allowable reactor operating limits.

Another element of the safety analysis program is control of special nuclear material. Handling procedures are developed and monitored to prevent unsafe material configurations during transport and storage. Additionally, material movement and storage locations are meticulously tracked to ensure strict accountability.

During Fiscal Year 1987, the safety analysis program will: (1) continue to provide centralized material control and accountability, safeguard training, procedures, and qualification for areas authorized to hold nuclear material; (2) develop and qualify loss-of-coolant casualty analysis methods; (3) complete thermal analysis of spent fuel handling; (4) develop improved models and methods for safety analysis of reactor plants; and (5) maintain nuclear accountability and standards for all fuel handling operations.

Nuclear Design and Analysis work is heavily dependent upon complex highly sophisticated computer codes. Work will continue to make existing codes more efficient and representative of reactor characteristics, and in developing new codes. The capabilities of computing resources can be a limiting factor. In Fiscal Year 1987 the Naval Reactors Development program will continue updating its scientific computing resources with the addition of a scientific computer system at one laboratory. Considerable effort will be required to convert existing computer codes to the new computer systems.

d. Reactor Technology

Reactor Technology work focuses on designing new and innovative reactor features which will achieve the objectives of higher power, longer life and more reliable naval reactors. Work is accomplished through a four-step process: (1) design of reactor components meeting functional requirements; (2) analysis of components to demonstrate acceptable performance; (3) manufacture of developmental components and testing of them to ensure they function according to design; and (4) advanced technology development aimed at solving complex problems in the areas of nuclear analysis, thermal performance and hydraulics, structural mechanics, corrosion, fatigue, noise, shock, and vibration.

Reactor features and characteristics depend on the physical properties of individual reactor components. These components include reactor cores and support structures, pressure vessels and closure heads, core barrel assemblies, control rod drive mechanisms and core instrumentation equipment. Acceptability of component design is determined by how well the design balances the competing requirements of performance, serviceability and reliability. Thermal, hydraulic, and structural analyses of individual components and system configurations are used to characterize the effects of temperature, pressure, flow, fatigue, shock, and vibration on the components and systems. Integral to this effort is computer simulation of operational conditions and testing of components and systems currently in operation.

Performance predictions generated during the analysis phase of Reactor Technology work are evaluated and verified in full-scale model testing. Developmental components are fabricated and installed in prototype naval reactor plants, allowing component performance to be measured in an operating environment. Additionally, developmental components and full scale mockups are assembled in test loops enabling researchers to isolate and test specific component and system attributes such as noise generation, vibration and shock resistance, and heat transfer characteristics. Data from these tests form the basis for design refinements, qualification, and fabrication release to vendors. These data are also used to update design manuals and are factored into computer analysis techniques.

A major portion of Reactor Technology work in FY 1987 will involve production of prototype components for the Advanced Fleet Reactor. This reactor will provide higher power and improved performance for the Navy's new design attack submarine.

During FY 1987 Reactor Technology work will concentrate on the Advanced Fleet Reactor components. Specific work items will include: (1) completion and qualification of component and system designs and fabrication of prototype components; (2) completion of final design of the Avanced Fleet Reactor prototype core instrumentation, reactor vessel and closure assembly and associated reactor equipment; (3) component and system testing, with a test of a full size core module; (4) hydraulic analyses and thermal performance calculations for the prototype core; (5) continued fabrication of full-size reactor components for the integrated reactor assembly test loops; and (6) testing of the prototype reactor design. Other Reactor Technology work will include: ongoing research into thermal hydraulic processes, plant optimization analyses, thermal conductivity of various alloys, mechanical properties of reactor components; and new analysis techniques.

e. Reactor Process Development

Reactor Process Development efforts builds developmental cores and fuel cells, and improves and implements processes for the manufacture of naval nuclear reactor fuel, cores, and reactor components.

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To realize the performance gains promised by advanced reactor designs, Naval Reactors is developing and refining manufacturing techniques and processes to accommodate the stringent material and design specifications for advanced core and reactor components, while retaining viability for large-scale production. Advanced welding techniques which produce higher integrity - a major factor in structural integrity - also are under development.

Naval reactor component and material design specifications are precise, with minute allowable variances. To ensure technology is correctly implemented, Naval Reactors provides technical assistance to vendors. Exacting quality assurance requirements must be met throughout manufacture; the manufacturing techniques and processes used are continuously upgraded and improved to provide greater assurance of conformance to specifications.

Reactor Process Development work culminates in the production of advanced developmental fuel cells and reactor cores. Main efforts in this area in FY 1987 will include: (1) follow of the installation of the Submarine Test Core in a prototype naval reactor plant; (2) the production of the Developmental Materials Core which will prove out new materials and material concepts; (3) development and production of the Advanced Fleet Reactor prototype core; (4) completing the qualification of a second source of supply for naval nuclear fuel material and continuing technical follow of the current source of supply; (5) continuing development and qualification of new and innovative core manufacturing, inspection and process control techniques; and (6) completing development of an advanced fabrication process and initiating qualification of the process on full-size core preassembly structures.

Capital Equipment

Capital equipment requirements for FY 1987 reflect the Program's efforts to maintain and upgrade eight land based prototype nuclear propulsion plants, provide computing resources commensurate with requirements, increase the efficiency of test and examination facilities, and replace aging equipment.

Items of capital equipment required are: (1) quality assurance equipment, including automation and metrification of measuring equipment; (2) process development equipment, such as heat treatment, laser and metal work equipment; (3) laboratory and engineering test equipment including pumps, autoclaves, and specialized test units; (4) analytic, spectro-chemical and corrosion laboratory equipment, such as test units, systems, and analyzers; (5) fabrication and inspection equipment, including hot cell upgrades, manipulators, oscillographs, and miscellaneous replacement equipment; (6) radiation and safety equipment such as survey meters and assay gauges; and (7) safeguards and security equipment such as radio and alarm systems and physical security upgrades. Also, improved and replacement equipment and systems are needed to provide for the analysis and examination of spent fuel assemblies and other components operated in nuclear propulsion plants including: handling, processing, assembly, and storage equipment and various pieces of support equipment.

Specific requirements include new computers to replace aging scientific computers which are becoming unreliable and difficult and expensive to maintain. Computers are essential resources for reactor design and development. Only through the use of advanced computing equipment can complete and thorough analyses of alternative and competing core and component designs be performed, thus maximizing the performance gains obtained from developmental equipment. FY 1987 capital equipment requirements include procuring a scientific mainframe computer for the Knolls Atomic Power Laboratory, as part of a continuing effort to maintain needed laboratory computing capabilities.

Construction

In Fiscal Year 1987, major construction funds are requested for funding of Kesselring Site Facilities Upgrade, project number 87-N-102, and funding of Computation Laboratory Addition, project number 87-N-103.

The Kesselring Site Facilities Upgrade project consists of constructing two buildings and modifying existing facilities and replacing obsolete utilities at the Kesselring Site in West Milton, New York. The project will provide additional facilities to support site activities and to facilitate prototype plant servicings, including radiological work requirements. The project is required to meet the needs generated by the increasing prototype plant overhaul and refueling workload as well as an increased level of training activity.

The Computation Laboratory Addition will provide for the construction of an addition to the existing computer facility at the Bettis Atomic Power Laboratory in West Mifflin, Pennsylvania. The project is required to accommodate the planned installation of needed replacement computer and support equipment and security improvements. The new addition will house the scientific computer currently planned for FY 1988.

General Plant Project funds are required for minor construction, facilities upgrades, and minor plant improvements at Naval Reactors' laboratories and prototype sites. This work will provide for continuity of present and planned operations, contribute to operating efficiencies, enhance prototype servicing capabilities, upgrade security, improve energy conservation, reduce operating costs, and provide facilities to take full advantage of technological advances. Fiscal Year 1987 General Plant Projects are based on current projections of required facilities upgrades and additions, land improvements, building alterations, and include minor facilities expansion or renovation activities needed to support the Program's research and development effort.

II. Plant Development

	FY 1986 Adjusted Appropriation	FY 1987 Request
Operating Expenses	$62,500	$71,000

Plant Development effort improves overall reactor plant performance through developing plant designs, and components and systems to complement the performance gains achieved through advanced reactor designs.

Determination of plant configuration and size is a critical design task prior to initiating component design and development work. Reactor plant arrangement studies provide initial limits and overall size and organization of components and systems. Resultant system and component designs are tested in full scale mockups to determine conformance to design limitations.

A number of factors bear on plant performance. Improvements in these factors will enhance performance and ensure safe and reliable plant operation. Pressurized water reactors, as the name implies, rely on water to transfer thermal energy. Unfortunately, water also causes corrosion, as does radiation. The effect of these corrosive agents limits component performance over the long term leading to operational restrictions, and costly overhauls and equipment replacement. Besides work directly related to improving water chemistry and reducing radiation effects, effort is devoted to improving material to withstand corrosion, reduce weight and enhance heat transfer features. Work is also directed to new plant concepts, and methods to decontaminate plants.

Instrumentation is also a factor in determining plant operating parameters and, thus, is a factor in overall plant performance. The rapid advances in electronics need to be incorporated into plant instrumentation to allow quicker plant reaction through more responsive instrumentation, higher plant power due to reduced instrumentation variables, and greater reliability because of simplified electronic components. Electronic advances will also allow reductions in weight and space requirements for instrumentation, always a consideration in a naval plant.

Plant improvements would be meaningless without the personnel to operate them. A major factor for nuclear plant operation, therefore, is radiation exposure control. Naval Reactors has been very successful at minimizing personnel radiation exposure and intends to maintain this performance. Toward this end, Naval Reactors develops, implements and evaluates radiation monitoring and control techniques.

attributable to strict enforcement of established controls, extensive monitoring programs, and continuing development of more effective procedures and techniques. In Fiscal Year 1987, work in this area will include: (1) continuing to evaluate radiochemistry methods to identify and understand the cause of unexpected trends and to propose solutions; (2) continuing qualification and training of radiological control technicians to ensure proper conduct of periodic audits and surveys; (3) performing and evaluating environmental monitoring programs; (4) continued dismantling and removal of inactive irradiated facilities; and (5) continuing waste management activities.

b. Plant Technology

Plant Technology work improves the capabilities of propulsion plant systems through development of primary plant fluid, mechanical, and electrical systems and reactor plant instrumentation and control systems. The results of these efforts are manifested in reduced maintenance requirements, increased system reliability, simplified operating procedures, improved-plant efficiency, and optimal reactor compartment space utilization.

Plant component and system design work is a complex, iterative process. Fleet and prototype operating experience, material and chemistry development results, reactor plant power, noise and vibration design specifications, and reactor compartment space and weight limitations must be factored into new component and system designs. Integration of individual components into larger systems requires concurrent design analyses of each component. Detailed analytic models are used to emulate component and system performance under normal and abnormal plant conditions, and form the basis for design modifications. Partial and full mockups of resultant designs are installed in test loops and specialized testing facilities, and their performance evaluated against design specifications. Test components are then fabricated and installed in prototypes and periodically inspected to evaluate their in-service performance. To ensure these inspections are accurate, safe and reliable, plant technology work includes development and implementation of improved inspection techniques for in-service and developmental components.

In Fiscal Year 1987, system and component design work will include: (1) evaluating steam generator thermal, hydraulic and mechanical performance through laboratory testing, and plant monitoring and analysis; (2) conducting flow tests on components in test loops under simulated reactor conditions to resolve problems encountered in prototype and other operating reactors, confirm adequacy of new designs, such as tests on Advanced Fleet Reactor components in the Hot Quiet Test Facility, and develop improvements for existing designs; (3) developing and testing innovative steam generator designs; and (4) carrying out design analysis for prototype reactor plant and off hull systems and revising design manuals and test procedures.

The assurance of safe and reliable plant operation requires accurate and consistent reporting of plant conditions and effective means of controlling those conditions. Plant Technology work includes research, development and design of electrical components and instrumentation and control systems capable of providing that assurance. Advances in the fields of electronics and microprocessor technology provide opportunities for more effective, simpler, and reliable instrumentation and control equipment designs.

Advanced instrumentation and control equipment work during Fiscal Year 1987 will include: (1) designing and testing advanced instrumentation and control equipment such as that for the Advanced Fleet Reactor and testing the new equipment in prototype plants; (2) developing new technology and investigating alternate technologies to be used in advanced designs of instrumentation and control equipment; and (3) preparing design manual updates to reflect new system configurations.

Other Plant Technology work in Fiscal Year 1987 includes performing reactor plant protection analyses to assure that equipment and procedures result in acceptable operating plant conditions and safety analysis to ensure that necessary margins are maintained during prototype testing. Additionally, effort will continue to develop, test, and qualify plant emulation procedures and techniques.

III. Reactor Operation and Evaluation

	FY 1986 Adjusted Appropriation	FY 1987 Request
Operating Expenses	$139,000	$173,000

Reactor Operation and Evaluation involves the operation and service of eight land-based prototype naval nuclear propulsion plants used to test new cores, components, and systems, and also used to train Navy personnel as reactor plant operators. New equipment is subject to a number of tests during development, but final design confirmation is only possible through operation in a prototype plant. Special instrumentation in the prototype plants provides data for evaluation of the new equipment and to improve the precision of design methods. Use of the prototype plants allows several years of operating experience prior to fleet application. To the extent possible, equipment continues to operate in the prototype plant after fleet introduction to uncover any problems before they are encountered in the fleet.

A heavy schedule of prototype plant overhauls and refuelings started in FY 1984 and will continue into the early 1990's. During the remainder of the period, major servicing work will be carried out on seven plants. In addition to inserting new test cores and components, existing test units will be checked, and plants will be overhauled. The planned overhauls are more extensive than those previously conducted due to the increasing age of the plants, which now average 25 years. Experience gained and methods used in these overhauls will be directly applicable to the fleet plants whose average age is also increasing.

Reactor Operation and Evaluation is broken down into three categories: (a) Reactor Servicing and Refueling; (b) Reactor Engineering and Analysis; and (c) Reactor Operation and Testing.

a. Reactor Servicing and Refueling

Reactor Servicing and Refueling encompasses the performance of major prototype servicing operations, including reactor plant refuelings, overhauls, component examination, and component removal and replacement. Ensuring all servicing and refueling activities are accomplished safely and efficiently requires the design and development of specialized equipment and procedures. This effort includes: design, development, and fabrication of refueling systems and equipment; and design and implementation of actual refueling and servicing procedures and techniques. Equipment and procedures proven out on the prototype plants are then used for similar fleet servicing activities.

Prototype refuelings and overhauls are scheduled and planned far in advance of the actual servicing operations. However, the complete scope of work cannot be determined until the plant is opened and servicing work has begun. Personnel are trained in all aspects of prototype servicing to accommodate emergent servicing requirements. Continued strong emphasis on thorough overhauls and maintenance is essential to ensure the prototype plants operate safely throughout their planned lifetimes.

Other work under Reactor Servicing and Refueling includes design, analysis, and testing of shipping containers for the disposal of components and cores removed during servicing activities. These containers transport irradiated material from the prototype site to examination and disposal facilities.

In FY 1987, Reactor Servicing and Refueling work will include: (1) performance of the S3G refueling and overhaul; (2) preparation for refueling and overhaul of the MARF prototype; (3) performance of an A1W prototype overhaul; (4) preparation for retirement of the S1W prototype plant; (5) continued preparation and development of reactor servicing procedures, techniques, and equipment; and (6) application of these procedures, techniques, and equipment to fleet servicing activities.

b. Reactor Engineering and Analysis

Reactor Engineering and Analysis consists of evaluating the performance and condition of operating reactor plants and components and comparing actual operating characteristics against design specifications. This effort includes thermal, hydraulic, and mechanical tests, and analyses of cores and reactor equipment to ensure reliable performance. These tests and analyses provide valuable data on how equipment and components perform in actual operating reactor plant environments.

Data obtained from reactor plant operation are analyzed to ensure operation does not violate design limits and to confirm that reactor equipment will last the life of the core. Materials exposed to radioactivity in operating reactor plant environments eventually become susceptible to brittle fracture. This can limit the potential life of a reactor plant. Performance of brittle fracture analysis through ultrasonic and acoustic testing and examination is a means to determine material performance and condition in an operating plant.

Reactor Engineering and Analysis provides important input into the design of new cores and reactor components. Determining the reliability of core and material performance in operating prototype reactors provides information which is used to project the condition of existing fleet operating reactor plants and derive potential design changes for new cores and reactor components.

In Fiscal Year 1987, Reactor Engineering and Analysis work will include: (1) assessment of design reliability and prototype reactor and component performance through thermal, hydraulic, noise, and mechanical analysis and testing; (2) performance of stress, vibration, and brittle fracture analysis to establish reactor operating limits and aid in hardware redesign; (3) development of ultrasonic testing capability; and (4) engineering work to resolve reactor plant hardware concerns and evaluate impact of emergent technology on operating and replacement reactor components.

c. Reactor Operation and Testing

Reactor Operation and Testing provides for the day-to-day operation and routine maintenance of prototype reactor plants which test advanced cores, developmental components, materials, instrumentation, and reactor and propulsion plant systems. This effort also includes the development of inspection programs and procedures for use in reactor plant operating environments. An important function is the training and instruction of personnel to ensure continued safe and reliable operation and maintenance of the prototypes.

Each prototype plant requires quality assurance, radiological control, technical services, and crafts effort to ensure safe and efficient operation and maintenance. Routine maintenance and minor servicing require detailed planning and scheduling of plant operations. Additionally, Navy personnel are given hands-on experience with operating reactor plants to prepare for fleet assignments as reactor plant operators.

Testing performed at the prototypes is carefully monitored to obtain information for new core, component, instrumentation, and propulsion plant system design and development. Data obtained from these tests are also used to resolve emergent design and technical problems experienced during reactor plant operation.

For FY 1987, Reactor Operation and Testing work will include continuing: (1) operation of reactor plants not shut down for servicing; (2) routine preventive and corrective maintenance on the prototype reactor plants; (3) testing of developmental cores, components, and systems to provide data for application to fleet reactor plants; (4) upgrading spare parts management systems; and (5) training of reactor plant operators.

Program Direction

	FY 1986 Adjusted Appropriation	FY 1987 Request
Operating Expenses	$10,923	$11,800

Program direction provides for salaries, benefits, travel, and other expenses for 213 full time Federal employees at the Naval Reactors, Pittsburgh Naval Reactors, and Schenectady Naval Reactors Offices in support of the Naval Reactors Development and Water Cooled Breeder programs.

Naval Reactors could use more personnel, but due to current constraints sufficient high quality personnel cannot be hired. A further concern, and in some respects a more serious one, is the increasing difficulty in retaining personnel. Through careful management and the dedication of existing employees these concerns are not urgent near term problems, but over the longer term will have an adverse effect upon the Program.

Naval Nuclear Propulsion Program personnel are responsible for the reactor plants powering 40% of the Navy's combatants. This requires overseeing and setting policies and procedures affecting numerous organizations including shipyards, operating ships, and contractors. Program personnel also are directly involved in testing, inspecting, and qualifying operating plants and personnel to ensure the high standards of the program are maintained.

Augmenting this support is the development of improved nuclear propulsion plants incorporating the latest advances in reactor technology, fuels, materials, and manufacturing techniques. These plants are used in the Navy's latest nuclear powered warships. Another program supported by Naval Reactors personnel is the Water Cooled Breeder program, which is evaluating the Light Water Breeder Reactor performance. The Light Water Breeder Reactor was the only water cooled breeder reactor ever operated in the United States to supply commercial electric power.

Naval Reactors' personnel maintain close program management and technical direction of the Bettis and Knolls Atomic Power Laboratories and associated facilities, with a combined employment of about 6,800. These laboratories are Government-owned, contractor-operated facilities solely devoted to the Naval Nuclear Propulsion Program.

The Naval Reactors manning level requested for Fiscal Year 1987 is needed to support ongoing programs. Despite increasing workloads there is no change in existing staffing for the reason noted above. Naval Reactors continues to operate with austere staffing.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT OVERVIEW
NAVAL REACTORS DEVELOPMENT
(in thousands of dollars)

Project Number	Project Title	TEC	FY 1986 Adjusted Appropriation	FY 1987 Request
87-N-101	General Plant Projects	$ 4,800	$ 0	$ 4,800
87-N-102	Kesselring Site Facilities Upgrade	$ 13,400	$ 0	$ 5,000
87-N-103	Computation Laboratory Addition	$ 2,300	$ 0	$ 2,300
86-N-101	General Plant Projects	$ 3,770	$ 3,770	$ 0
82-N-111	Materials Facility	$176,000	$11,000	$ 0
81-T-112	Modifications and Additions to Prototype Facilities	$137,000	$27,000	$ 0
86-N-104	Reactor Modifications: Advanced Test Reactor	$ 4,500	$ 4,500	$ 0
TOTAL			$46,270	$ 12,100

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS

Atomic Energy Defense Activities
Naval Reactors Development

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General Plant Projects
Various

2. Project No. 87-N-101

3. Date A-E work initiated: 1st Qtr. - FY 1987

3a. Date physical construction starts: 2nd Qtr. - FY 1987

4. Date construction ends: 3rd Qtr. - FY 1988

5. Previous Cost Estimate: None
Date: N/A

6. Current Cost Estimate: $4,800
Date: January 1986

7. Financial schedule

Fiscal Years	Obligations	COSTS FY 1985	COSTS FY 1986	COSTS FY 1987	COSTS After FY 1987
Prior Years	$ 000	$4,700	$3,700	$ 700	$ 000
1985	2,000	200	1,600	200	000
1986	4,000	000	1,500	2,200	300
1986 Amount Sequestered	(230)	000	000	000	(230)
1987	4,800	000	000	1,900	2,900
		$4,900	$6,800	$5,000	$ 2,970

8. Brief physical description of project

This project provides for minor plant improvements, alterations, additions, and new construction at Naval Reactors' laboratories. In general, these projects consist of land improvements, building alterations, utility improvements, additions to existing facilities, and upgrading present facilities. The work contemplated under this project will provide continuity of present and planned operations, contribute to operating efficiencies, increase safeguards and security capabilities, enhance prototype servicing capabilities, improve energy conservation, reduce maintenance and operating

Construction Project Data Sheets

1. Title and location of project: General Plant Projects
Various

2. Project No. 87-N-101

costs, and provide facilities to take full advantage of technological advances. The estimate is based on projected requirements for the individual operations offices, as follow:

Pittsburgh Naval Reactors Office	$1,700,000
Schenectady Naval Reactors Office	$3,100,000

9. Purpose, justification of need for, and scope of project

The estimate for FY 1987 general plant projects is based on projected requirements for new plant and other facilities which are coming into operation, and certain special non-recurring projects, which, because of their nature, fall within the criteria for general plant projects. FY 1987 general plant projects will primarily support further enhancements of safeguards and security, and current prototype servicing schedules.

Work under general plant projects will include modifications or betterments to existing buildings and other facilities; safeguard and security upgrades; additions to buildings to house new equipment or personnel; construction of prototype servicing facilities; replacement or additions to roads and utility lines; and general area improvements and development programs to provide for safe and economic operation.

Listed below are examples of proposed subprojects:

a. Central Alarm Station Relocations $ 500,000

This work will provide for the relocation of the central alarm stations at Naval Reactors Kesselring and Windsor Sites. The central alarm stations house all safeguards alarms and communications controls for the security guards at the Kesselring and Windsor Sites. Both stations are currently located along the protected area perimeter fenceline and are considered vulnerable to attack. This project will relocate the stations to areas inside the perimeter fenceline and include modifications to enhance protection capabilities.

b. Radioactive Materials Laboratory Exhaust System Upgrade $ 400,000

This project will provide for the relocation and replacement of portions of the ventilation system for the Radioactive Materials Laboratory facility at the Knolls Atomic Power Laboratory. The Radioactive Materials Laboratory performs tests and examinations on radioactive and contaminated fuel specimens and structural materials. Currently, the High Efficiency Particulate Air (HEPA) and charcoal filters are housed on the roof of the facility. Relocating and upgrading these filters, housings, and associated piping is required to improve maintenance capabilities and prevent susceptibility to damage from severe weather conditions.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General Plant Projects
Various
2. Project No. 87-N-101

---

c. ECF M-130 Work Stations $ 700,000

This project will provide a work station to unload expended cores from M-130 shipping containers at Naval Reactors Expended Core Facility in Idaho. The work station is required to increase the rate at which M-130's can be unloaded and processed to support the increasing number of prototype and ship refuelings scheduled into the 1990's. The facility will be capable of processing two shipping containers at one time and will replace portable platforms currently in use. The work station will provide the capablity to perform maintenance on shipping containers as required.

10. Details of cost estimate

Details of cost estimates for this project are not available at this time. Detailed cost estimates for general plant projects are normally made in connection with the request for directive after the need for the work has been established, the job has been scoped, and preliminary engineering completed.

11. Method of performance

Design will be by the operating contractor and through negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be through fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

Not required.

13. Narrative explanation of total project funding and other related funding requirements.

No narrative required.

14. Incorporation of Fallout Shelters:

Not applicable.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General Plant Projects
Various

2. Project No. 87-N-101

15. Pollution Prevention, Abatement, and Control:

Not applicable.

16. Evaluation of Flood Hazards:

Not applicable.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS

Atomic Energy Defense Activities
Naval Reactors Development
(Tabular Dollars in Thousands. Narrative material in whole dollars)

---

1. Title and Location of Projects:

Kesselring Site Facilities Upgrade
Knolls Atomic Power Laboratory, Niskayuna, New York

2. Project No.: 87-N-102

---

3. Date A-E work initiated
1st Quarter, FY 1987

3a. Date physical construction starts:
1st Quarter, FY 1988

4. Date construction ends:
2nd Quarter, FY 1990

5. Previous cost estimate:
None

6. Current cost estimate:
$13,400
Date: January 1986

---

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$ 5,000	$ 5,000	$ 5,000	$3,000
1988	$ 8,400	$ 8,400	$ 8,400	$4,500
1989	$ 0	$ 0	$ 0	$4,900
1990	$ 0	$ 0	$ 0	$1,000

8. Brief Physical Description of Work:

The project provides for: construction of two buildings, a controlled industrial building and a support building; modification of existing facilities to support radiological work requirements, training needs and prototype plant servicing; and refurbishment and replacement of obsolescent utilities.

The controlled industrial building will be comparable in features, but smaller than facilities used by shipyards performing similar naval nuclear propulsion plant work. The 15,000 square foot, reinforced concrete and metal building will consist of three primary areas: a 6,000 square foot high bay with a 20 ton bridge crane for work on large components; a 3,000 square foot low bay area for work on small components including a gauge calibration room, chemistry laboratory and waste packaging room; and a 6,000 square foot support area in a two story wing to provide office and locker space, instrumentation room, and mechanical services. A special ventilation system will keep the building at a slightly negative pressure to facilitate control of building conditions. A new support building is required to release space at the

1. Title and Location of Projects:
Kesselring Site Facilities Upgrade
Knolls Atomic Power Laboratory, Niskayuna, NY

2. Project No. 87-N-102

prototype plants for maintenance use, consolidate and expand training activities so that personnel and equipment can be used more effectively to train additional plant operators, and provide needed offices, laboratories, and other work areas to support Site activities. The building will be a two-story, 28,000 square feet, steel framed, windowless structure approximately 140 feet by 100 feet.

Three 22 year old interconnected, prefabricated buildings with a floor area of 18,400 square feet will be renovated to provide a central facility to house a dispensary, metrology laboratory, dosimetry laboratory, chemistry laboratory, administrative services, and site radiological control services. This renovation will consolidate support activities presently scattered around the Site in buildings not designed for laboratory and support facilities and make this space available for needed storage and staging of materials to be used in the maintenance and overhaul work. The total space now allocated to these support services will increase to reflect the increasing workload.

This project also includes extension of utility lines, improvements such as paving, fencing, walkways, and landscaping, construction of two electrical load centers, and replacement of the present antiquated and inoperable backup heating boilers with new high efficiency boilers.

9. Purpose, Justification of Need for, and Scope of Project:

The Kesselring Site consists of four prototype naval nuclear propulsion plants and supporting facilities used for testing nuclear cores, components, and systems, and for training plant operators. The support facilities now available at the Site are inadequate to handle the substantial increase in materials and people required to accomplish the increase in scheduled prototype plant overhauls and refuelings along with an increased level of training activity. Improved facilities are required to effectively perform work on reactor components and refueling equipment in accordance with Naval Nuclear Propulsion Program requirements. At the present time, the Site has no central radiological work area capable of supporting overhaul and refueling of the prototype reactor plants.

1. Title and Location of Projects:
Kesselring Site Facilities Upgrade
Knolls Atomic Power Laboratory, Niskayuna, NY

2. Project No. 87-N-102

		($ in thousands)	
10.	Details of Cost Estimate	Item Cost	Total Cost
	(a) Engineering, design and inspection at 14% of construction cost		$ 1,200
	(b) Construction Cost		8,460
	(1) Improvements to land	1,255	
	(2) Buildings	4,715	
	(3) Utilities	1,525	
	(4) Special Facilities	965	
	(c) Standard Equipment		1,920
	(d) Removal Cost, Less Salvage		600
	Subtotal		$12,180
	(e) Contingency @ 10% of above costs		1,220
	Total Estimated Project Cost		$13,400

11. Method of Performance

Design of the controlled industrial building and the support building will be accomplished by negotiated architect-engineer contract. Design of the utilities upgrade and renovation of support spaces will be accomplished in-house. Construction of facilities and procurement of equipment by fixed price contract will be awarded on the basis of competitive bids for all portions of this project.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Year	FY 1987	FY 1988	FY 1989	FY 1990	TOTAL
1. Total facility cost						
(a) Construction line item	0	$3,000	$4,500	$4,900	$1,000	$13,400
(b) PE&D	0	0	0	0	0	0
(c) Inventories	0	0	0	0	0	0
Total Facility Cost	0	$3,000	$4,500	$4,900	$1,000	$13,400

Construction Project Data Sheets

1. Title and Location of Projects: Kesselring Site Facilities Upgrade Knolls Atomic Power Laboratory, Niskayuna, NY	2. Project No. 87-N-102

2. Other Project Funding						
(a) R&D necesary to complete construction	0	0	0	0	0	0
(b) Other project related costs	0	0	0	0	0	0
Total other project funding	0	0	0	0	0	0
Total Project funding	0	$3,000	$4,500	$4,900	$1,000	$13,400

b. Total related funding requirements (estimated life of project 20 years)

1. Facility operating costs	$ 60
2. Programmatic operating expense directly related to facility	160
3. Capital equipment not related to construction but related to the programmatic effort in the facility	80
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual funding requirements	$300

13. Narrative Explanation of Total Project Funding and Other Related Funding

a. Total Project Funding:
No narrative required

b. Total related funding requirements:

1. Facility Operating Costs:
The primary factor is the additional fuel oil consumption to heat the two new buildings.

2. Programmatic Operating Expenses Directly Related to the Facility:
Operating funds directly related to this facility will be used for acquisition of containments, glove boxes, vacuum cleaners, miscellaneous tooling and furnishings. As these items are consumable, there will be a cycle of replacement.

1. Title and Location of Projects: Kesselring Site Facilities Upgrade Knolls Atomic Power Laboratory, Niskayuna, NY	2. Project No. 87-N-102

3. GPP or other construction related to programmatic effort:
No narrative required.

4. Other costs:
No narrative required.

14. Incorporation of Fallout Shelters

The support building and the renovated support spaces are not suitable as Fallout Shelters due to the type of pre-engineered construction which does not provide for below ground excavation. The controlled industrial building is not suitable for use as a fallout shelter because of the radiological repair work planned for accomplishment in the facility.

15. Pollution Prevention, Abatement and Control

The total estimated cost includes those measures to comply with Presidential Executive Order 12088. Waterborne effluents will consist of sanitary waste and processed discharge waste that will be discharged to the existing sewage treatment plant. Airborne effluents will be limited to air exhausted by the ventilation system or special ventilation with an environmental stack permit.

16. Evaluation of Flood Hazards

This project is located in an area not subject to flooding, determined in accordance with Executive Order 11988.

17. Environmental Impact

This project will be planned to comply with National Environmental Policy Act, DOE 5440.1B, IMPLEMENTATION OF THE NATIONAL ENVIRONMENTAL POLICY ACT, the Council on Environmental Quality Regulation (40 CFR 1500-1508), DOE's NEPA guidelines (45 FR 20694, as amended), DOE's regulation 10 CFR 1022, and other related applicable statutes. The proposed building is not located in a floodplain/wetland.

DOE/MA-0064/4
Volume 2 of 7

Congressional Budget Request

Energy Supply Research and Development
Nuclear Waste fund

Volume 2

FY 1987

U.S. Department of Energy
Assistant Secretary,
Management and Administration
Office of the Controller
Washington, D.C. 20585

February 1986

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

NUCLEAR WASTE FUND

VOLUME 2

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DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1985 Actual BA	FY 1986 Estimate BA	FY 1987 Request BA
Appropriations Before The Energy and Water Development Subcommittees:			
Energy Supply Research and Development	1,967,490	1,698,290	1,254,282
Uranium Enrichment	237,956	190,512	---
General Science and Research	724,860	655,928	771,600
Atomic Energy Defense Activities ..	7,322,321	7,231,664	8,230,000
Departmental Administration	128,602	150,370	151,082
Alaska Power Administration	3,233	3,265	2,003
Bonneville Power Administration ...	284,771	330,000	270,330
Southeastern Power Administration .	35,744	---	29,647
Southwestern Power Administration .	31,208	29,101	25,337
Western Area Power Administration .	218,230	195,920	260,309
Western Area Power Emergency Fund .	---	---	---
Federal Energy Regulatory Commission	54,543	41,009	35,375
Nuclear Waste Fund	327,669	499,337	760,100
Geothermal Resources Development Fund	121	60	72
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	$11,336,748	$11,024,282	$11,762,684

1. Title and Location of Projects:
Kesselring Site Facilities Upgrade
Knolls Atomic Power Laboratory, Niskayuna, NY

2. Project No. 87-N-102

18. Accessibility for the Handicapped

This project will not be designed to provide accessibility to the handicapped in accordance with the Architectural Barriers Act (Public Law 90-480) and the Federal Property Management Regulations (41 CFR 101-91.6). This project need not, because of its intended use, be made accessible to, or usable by, the public or by severely, physically handicapped persons.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS

Atomic Energy Defense Activities
Naval Reactors Development

(Tabular dollars in thousands. Narrative material in whole dollars)

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1. Title and Location of Project:

   Computation Laboratory Addition
   Bettis Atomic Power Laboratory, Pennsylvania

2. Project No. 87-N-103

3. Date A-E work initiated:
   1st Quarter FY 1987

3a. Date physical construction starts:
   4th Quarter FY 1987

4. Date construction ends:
   4th Quarter FY 1988

5. Previous cost estimate:
   None

6. Current cost estimate:
   $2,300
   Date: January 1986

7. Financial Schedule:

Fiscal Year	Authorization	Appropriation	Obligations	Costs
1987	$2,300	$2,300	$2,300	$ 650
1988	$ 0	$ 0	$ 0	$1,650

8. Brief Physical Description of Project

This project provides for the construction of a two story addition to an existing building to house the expanding Computation Laboratory. The addition to the building currently containing the Computation Laboratory will accommodate the installation of needed new computer and support equipment and improvements in security. The addition will be about 12,000 square feet in size, of masonry construction as is the existing building, and will meet all applicable security requirements. Raised floors will be installed to accommodate rearrangement of existing computer facilities and provide flexibility for optimizing locations of new computer systems. Security improvements will include installing a concrete slab roof on the addition and increasing the height of the site perimeter fence near the new facility.

Existing utility services will be extended to the new addition as part of this work effort and cooling water systems will be upgraded to provide redundant chillers and a cooling tower. This requires installation of several water chillers and

Construction Project Data Sheets

1. Title and location of Project:
Computation Laboratory Addition
Bettis Atomic Power Laboratory, Pennsylvania

2. Project No. 87-N-103

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air handlers, and associated equipment foundations.

9. Purpose, Justification of Need for, and Scope of Project

The purpose of this project is to provide necessary space to accommodate installation of a new computer and required auxiliary and utility systems and to upgrade security. A scientific computer system is currently anticipated for delivery to Bettis in FY 1988.

10. Details of Cost Estimate

($ in thousands)

	Item Cost	Total Cost
a. Engineering, design and inspection at 13% of construction costs		$ 195
b. Construction costs		1,450
(1) Improvements to land including grading, drainage diversion, paving, and fencing	19	
(2) Buildings		
(a) Two story area, 12,000 gross square feet	1,431	
(3) Other structures	0	
(4) Utilities including electrical power, water, drain lines	0	
(5) Special facilities	0	
c. Standard equipment		445
d. Removal less salvage		0
Subtotal		$2,090
e. Contingency at 10%		210
Total Estimated Cost		$2,300

1. Title and location of Project:
Computation Laboratory Addition
Bettis Atomic Power Laboratory, Pennsylvania

2. Project No. 87-N-103

11. Method of Performance

Contracting arrangements are as follows:

a. Design of the building addition will be accomplished via a cost plus fixed fee, sole source design contract. The construction and outfitting of the addition will be accomplished through fixed-price contracts awarded on the basis of competitive bidding.
b. Title III Inspection will be by the operating contractor.

12. and 13. Funding Schedule and Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Items 12 and 13 are not required. This project has a total estimated cost of less than $5 million and does not have significant "other direct project costs" and only minor "other related costs".

14. Incorporation of Fallout Shelters

The building to be constructed as a part of this project is not suitable as a fallout shelter because of the high concentration of electrical power and computer equipment to be installed in this building.

15. Federal Compliance with Pollution Control Standards

As presently conceived, operation of this project will not generate any environmental pollutants; therefore, the requirements of Executive Order 12088 are not applicable.

16. Evaluation of Flood Hazards

This project will be located in an area not subject to flooding determined in accordance with Executive Order 11988.

17. Environmental Impact

This project will be planned to comply with National Environmental Policy Act, DOE 5440.1B, IMPLEMENTATION OF THE NATIONAL ENVIRONMENTAL POLICY ACT, the Council on Environmental Quality Regulation (40 CFR 1500-1508), DOE's NEPA guidelines (45 FR 20694, as amended), DOE's regulation 10 CFR 1022, and other related applicable statutes. The proposed building is not located in a floodplain/wetland.

Construction Project Data Sheets

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1. Title and location of Project:
Computation Laboratory Addition
Bettis Atomic Power Laboratory, Pennsylvania

2. Project No. 87-N-103

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18. Accessibility for the Handicapped

This project will not be designed to provide accessibility to the handicapped in accordance witn the Architectural Barriers Act (Public Law 90-480) and the Federal Property Management Regulations (41 CFR 101-91.6). This project need not, because of its intended use, be made accessible to, or usable by, the public or by severely, physically handicapped persons.

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1985 Actual BA	FY 1986 Estimate BA	FY 1987 Request BA
Appropriations Before Interior and Related Agencies Subcommittees:			
Alternative Fuels Production	$ 1,169,895	$ ---	$ ---
Clean Coal Technology	---	---	---
Fossil Energy Research and Development	289,048	311,954	82,767
Naval Petroleum and Oil Shale Reserves	156,874	13,002	127,108
Energy Conservation	457,436	427,512	39,433
Energy Regulation	27,139	23,423	21,850
Emergency Preparedness	6,045	5,750	6,044
Strategic Petroleum Reserve	2,049,550	107,533	---
Energy Information Activities	60,919	57,724	59,651
Subtotal, Interior and Related Agencies Subcommittees	4,216,906	946,898	336,853
Subtotal, Energy and Water Development Subcommittees	11,336,748	11,024,162	11,762,664
Subtotal, Department of Energy	15,553,654	11,971,060	12,099,517
Permanent - Indefinite Appropriations:			
Payments to States	1,052	570	570
Total, Department of Energy	$15,554,706	$11,971,630	$12,100,087

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
ENERGY & WATER SUBCOMMITTEE				
HEADQUARTERS	4,865	4,965	-18	4,947
FIELD	9,133	9,185	111	9,296
SUBCOMMITTEE TOTAL	13,998	14,150	93	14,243
INTERIOR SUBCOMMITTEE				
HEADQUARTERS	1,353	1,304	-166	1,138
FIELD	907	896	-226	670
SUBCOMMITTEE TOTAL	2,260	2,200	-392	1,808
GRAND TOTAL	16,258	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,258	16,218	-497	15,721

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
10:ENERGY SUPPLY RESEARCH AND DEV	937	934	-34	900
HEADQUARTERS	811	820	-28	792
FIELD	126	114	-6	108
15:URANIUM ENRICHMENT	69	66	1	67
HEADQUARTERS	58	55	1	56
FIELD	11	11	0	11
20:GENERAL SCIENCE AND RESEARCH	37	39	0	39
HEADQUARTERS	37	39	0	39
25:ATOMIC ENERGY DEFENSE ACTIVITI	2,618	2,702	131	2,833
HEADQUARTERS	496	518	9	527
FIELD	2,122	2,184	122	2,306
30:DEPARTMENTAL ADMINISTRATION	3,307	3,332	-5	3,327
HEADQUARTERS	1,721	1,726	0	1,726
FIELD	1,586	1,606	-5	1,601
34:ALASKA POWER ADMINISTRATION	37	38	0	38
FIELD	37	38	0	38
36:BONNEVILLE POWER ADMIN	3,510	3,480	0	3,480
FIELD	3,510	3,480	0	3,480
38:SOUTHEASTERN POWER ADMIN	38	40	0	40
FIELD	38	40	0	40
42:SOUTHWESTERN POWER ADMIN	186	186	0	186
FIELD	186	186	0	186
46:WESTERN AREA POWER ADMIN	1,181	1,160	0	1,160
FIELD	1,181	1,160	0	1,160
50:WAPA - COLORADO RIVER BASIN	219	219	0	219
FIELD	219	219	0	219
52:FEDERAL ENERGY REGULATORY COMM	1,617	1,659	0	1,659
HEADQUARTERS	1,617	1,659	0	1,659
54:NUCLEAR WASTE FUND	238	292	0	292
HEADQUARTERS	123	147	0	147
FIELD	115	145	0	145
56:GEOTHERMAL RESOURCES DEV FUND	2	1	0	1
HEADQUARTERS	2	1	0	1
65:FOSSIL ENERGY RESEARCH AND DEV	714	700	-161	539
HEADQUARTERS	151	135	-26	109
FIELD	563	565	-135	430
70:NAVAL PETROL & OIL SHALE RES	104	104	-9	95
HEADQUARTERS	23	23	0	23
FIELD	81	81	-9	72
75:ENERGY CONSERVATION	333	352	-134	218
HEADQUARTERS	208	227	-79	148
FIELD	125	125	-55	70
80:EMERGENCY PREPAREDNESS	74	71	0	71
HEADQUARTERS	74	71	0	71
81:ECONOMIC REGULATION	377	340	-50	290
HEADQUARTERS	377	340	-50	290
85:STRATEGIC PETROLEUM RESERVE	178	152	-32	120
HEADQUARTERS	40	27	-5	22
FIELD	138	125	-27	98
90:ENERGY INFORMATION ACTIVITIES	480	481	-6	475
HEADQUARTERS	480	481	-6	475
94:ADVANCES FOR CO-OP WORK	2	2	0	2
FIELD	2	2	0	2
GRAND TOTAL	16,258	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,258	16,218	-497	15,721

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Energy Supply, Research and Development Activities

(Including Transfer of Funds)

For expenses of the Department of Energy activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for energy supply, research and development activities, and other activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction or expansion; purchase of passenger motor vehicles (not to exceed [17] 18 for replacement only), [$1,989,671,000] $1,254,162, to remain available until expended [of which $200,000,000]; in addition, $584,158,000 shall be derived by transfer from Uranium Supply and Enrichment Activities provided in prior years[, and of which $17,400,000 shall be derived by transfer from Operation and Maintenance, Southeastern Power Administration; and of which $25,000,000 shall be available only for construction of]: Provided, That funds available under this head in Public Law 99-141 for the Advanced Science Center, the Center for Science and Technology, the Center for Energy and Biomedical Technology, the Energy and Mineral Research Center, and the Demonstration Center for Information Technologies [as described in the report accompanying this Act; together with not to exceed $6,000,000, to be derived from revenues from activities of the Technical Information Services, which shall be credited to this account and used for necessary expenses and shall remain available until expended], shall be available for other expenses of energy supply, research and development activities. (Public Law 99-141, making appropriations for energy and water development, 1986.)

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(Budget Authority in Thousands of Dollars)

	FY 1985 Actual	FY 1986 Estimate	FY 1987 Request
Solar Energy	$ 171,587	$ 144,624	$ 72,292
Geothermal	29,698	26,681	17,930
Hydropower	447	481	---
Electric Energy Systems	19,717	11,548	7,619
Energy Storage Systems	18,642	17,292	8,600
Nuclear Energy R&D	412,612	375,684	330,900
Remedial Action & Waste Technology	170,365	230,047	294,100
Civilian Waste R&D	25,886	16,064	6,500
Environmental, Safety and Health	38,053	46,921	76,098
Biological and Environmental Research	187,746	179,950	196,565
Liquified Gaseous Spill Test Facility	4,299	1,732	1,200
Magnetic Fusion	429,553	365,469	333,000
Basic Energy Sciences	410,800	433,770	441,370
Energy Research Analysis	2,970	2,598	3,550
University Research Instrumentation	4,950	6,254	5,000
University Research Support	10,098	10,296	10,975
Advisory and Oversight Program Direction	2,900	2,674	2,900
Multi-Program Laboratories Facilities Support	33,200	39,824	60,190
Small Business Innovation Research Program	24,724	---	---
In-House Energy Management	14,821	11,709	16,500
Technical Information and Management	13,442	12,413	10,775
Policy and Management	3,380	3,497	3,887
Subtotal, Energy Supply R&D	2,029,890	1,939,528	1,899,951
Less Use of Prior Year Balances and Other Adjustment	-62,400	-243,230	-645,789
Total, Energy Supply R&D	$1,967,490	$1,696,298	$1,254,162

DEPARTMENT OF ENERGY
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
VOLUME 2
SOLAR AND OTHER RENEWABLES

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Renewable Energy

PRINCIPAL RENEWABLE ENERGY ISSUES

Renewable energy based sources--solar, biofuels,wind, ocean, hydropower, and geothermal--presently account for about 8 percent of the energy consumed in the United States in 1984. In certain locations, the contribution of specific renewable energy technologies is even greater, e.g., 15 percent of all water heaters in Hawaii are solar, 8 percent of California's new electric generation capacity is renewable. As the various renewable energy technologies continue to develop, their economic and technological viability should improve and their collective contribution to the Nation's energy needs should continue to increase. Availability of this source of energy is thus a major element of national energy policy.

DOE's Renewable Energy Programs

DOE's renewable energy programs include a number of technology areas of potential importance to the nation's energy production, storage, and distribution network:

- Solar Buildings technology addresses the R&D associated with both active and passive solar heating and cooling, active domestic hot water heating, and passive daylighting.
- Photovoltaic technology converts sunlight directly into electricity through use of solid state electronic devices.
- Solar Thermal technologies focus sunlight on a receiver to produce electricity, heat, fuels, or chemicals.
- Biofuels technologies include the production of biomass feedstocks and the conversion of these and municipal waste into fuels.
- Wind energy technology employs a variety of technical concepts, including vertical axis turbines, horizontal axis turbines, augmenters, and contained systems.
- Ocean energy technologies use the thermal or kinetic energy stored in the oceans to produce electricity.
- Geothermal technology converts heat stored in geologic formations into useful energy. Four types of geothermal resources-- hydrothermal, geopressured, hot dry rock, and magma--are combined with several conversion technologies to produce useful energy as heat or electricity.
- Hydropower is the conversion of the kinetic energy of flowing water into mechanical or electrical energy.
- Electric energy systems supports research directed toward solving mid- to long-term problems in electric transmission and distribution, and incorporating new concepts and renewable energy resources into the utility network.

- Energy Storage supports advanced energy storage and electrochemical systems to facilitate the substitution of oil and gas fuels by coal, nuclear or renewable energy sources.

In 1974, when the federally supported renewable energy program began, most of these technologies were either in the conceptual stage or existed in rather primitive forms. Only solar water heaters, combustion of biomass materials and biogas digesters were in appreciable use in a few countries. Photovoltaic systems were used in space. Small wind machines to pump water and provide remote electrical output were commonplace in the early 1900's but had virtually disappeared in the 1970's. Only a few dry steam geothermal plants were in commercial operation. Use of woody biomass for the production of process heat and electricity especially in wood processing industries was well established. The only noteworthy ocean energy systems were small wave-power generators used for navigational buoys. Electric systems were small with only limited interregional interconnections, and only a few systems were equiped with any automated equipments for dispatching and management. Storage was conceptually defined but economics and reliability prevented its application.

During the past decade major advances have been made in all of the renewable energy technologies. New materials have been developed with the thermal, optical, and physical properties required for lower cost and higher performance. New components have been tested and substituted for less effective ones. Extensive systems analysis has been performed and hundreds of systems have been studied under both controlled laboratory conditions and typical field operation conditions. Teams of scientists and engineers in Government laboratories, universities, and industry have created a solid technology base and expertise in the extremely broad array of disciplines pertaining to renewable energy technologies.

The DOE estimates that renewable energy provided more than 8 percent of the primary energy consumed by the United States in 1982, primarily from direct combustion of wood, geothermal power, and hydropower. Renewable energy also represents more than 9 percent of indigenous energy production. The contribution of newer renewable energy technologies is more difficult to assess because their history in the marketplace is brief and statistically not yet significant. However, several indicators suggest that these technologies are already being recognized:

- Photovoltaic shipments increased from 2.5 MW in 1980 to over 12 MW--industry revenues are approximately $150 million.
- Small-to medium-scale wind turbines with total capacity of approximately 1,000 MW has been installed as of 1985.
- Some 800,000 to 1 million active water heating systems have been installed as of 1985.
- Geothermal electric systems provide in excess of 2,000 MWe and geothermal direct heating applications provide 60 trillion Btu per year as of 1985.
- Small-scale hydropower plants provide approximately 6,200 MWe from 1,153 plants.
- Direct combustion of wood currently contributes over 2.6 quads per year.
- Facilities for converting municipal waste to heat and electricity have risen from 7 in 1974 to 60 in 1985.

DOE projects that 13 percent of total energy consumption could be derived from renewable sources in 2010. Wood, geothermal, and hydropower are expected to provide most of this energy through the midterm, but newer technologies (e.g., photovoltaics, wind, solar building technologies, solar thermal power, advanced biofuels) should become significant at the national level during the 1990's. As renewable energy and other small scale or intermittent energy supply technologies become more prevalent, additional storage and control technologies will be required particularly as they relate to efficient and reliable management of the nation's electric energy system.

RENEWABLE ENERGY FRAMEWORK

Within the context of the National Energy Policy Plan, renewable energy sources can make a significant contribution to national energy needs. Renewable energy sources can complement conventional energy sources and can, through their diversity, reduce the impact of sudden energy supply interruptions or price increases in any single energy source. Renewable energy resources, where designed and constructed with appropriate storage and supply system interconnection technologies, can offer the flexibility of direct matching of various energy requirements with locally-available energy sources. The modularity of renewable energy equipment allows additions to be made in comparatively small increments, resulting in short lead time, reduced planning uncertainties, and comparatively small capital outlays. In rapidly changing and uncertain energy markets, this modularity offers significant economic benefits to energy producers and consumers.

A number of renewable energy technologies capable of providing these advantages are not yet a significant factor in the energy market. Additional R&D is required to accomplish and confirm the competitive viability of a number of these concepts while maintaining the integrity and safety of the nation's supply network. Long-term cost and demand projections indicate that many of these options represent attractive energy supply alternatives; however, the short-term outlook tends to discourage renewable energy investment by industry. Accordingly, continued Federal investment in renewable energy R&D appears prudent to ensure that a reasonable number of renewable energy supply options are available to the private sector in the long term. Additional factors influencing Federal investment in renewable energy R&D include:

- Early research breakthroughs often show enormous promise several years down the road. However, industry is frequently unable or unwilling to invest for an unknown or inadequately defined commodity. This is true of several renewable energy concepts where, despite remarkable initial success, a substantial amount of technical progress is still required before informed business decisions can be made regarding the individual technology options.

- The private sector frequently operates under a different set of decision criteria than does Government. One measure of this difference is in the time value of money used by industry and by Government. Heavy discounting typically employed in industrial decision making greatly reduces the value of long-term benefits relative to short-term results. Industry also views energy as just one input in the production process. Thus, industry will frequently reject investments unless they clearly offer nearer-term profits. Federal R&D investments may be justified in certain instances to encourage longer-term productivity and national returns.

- Individual private companies are rarely able to capture the full economic benefits of an investment in basic science or technology. Other companies often rapidly adopt a successful innovation and limit the company making the original R&D expenditure to a small share of the total market. This limits the willingness of individual companies to invest in certain types of long-term R&D. In the case of the technology options within this budget category, most may follow one of several possible technology development paths. Industrial investment often focuses on a single path in an area of proprietary interest that builds upon more generic investigations addressing broader areas of concern.

PROGRAM OBJECTIVES

The renewable energy budget category entails a broad variety of energy production, storage and distribution management technology which varies considerably with respect to verification of basic concepts and competitive viability. As a general rule federal funding is concentrated in basic and applied research and development which is conducive to informed decision making by the private sector regarding the development of a reasonably broad range of potentially competitive technology. Federal attention is concentrated on scientific and engineering research necessary to accomplish a better understanding of basic resource and technology phenomena, methods to employ these resources for producing competitive and useful forms of energy and important crosscutting technologies for storage of energy and for reliable and efficient management of the electric energy supply network.

Within this context, specific technology development objectives have been developed in collaboration with industry to ensure that federally funded research does not supplant research investments by the private sector and that federal investments are focussed on investigations most critical to advancing promising technology options towards confirmed competitive viability. Technology specific objectives vary somewhat according to the nature of the fundamental issues being addressed and the comparative definition of the technology involved. Guiding objectives for the federal effort therefore range from basic materials related issues such as the structural integrity of reflective surfaces or conversion efficiency of various photovoltaic or electrochemical storage materials; to resolution of wind technology reliability and durability issues through advancement of underlying structural and aerodynamic theory; to resolution of environmental uncertainty attendant to combustion of municipal wastes.

PROGRAM GUIDELINES

DOE has developed a generalized framework to uniformly assess multiyear applied research activities within each renewable energy technology.

The diversity of renewable energy technologies and the many storage and control mechanisms required for their incorporation into the energy supply network makes a uniform assessment of research and development programs extremely complex. While all renewable energy technologies ultimately depend on a renewable, frequently intermittent, energy resource such as wind or sunlight, a variety of conversion options (e.g., solar thermal systems, binary cycle geothermal) can produce one or more useful energy types, for example, electricity, fuel, and thermal energy which may be interfaced with various types of energy distribution and utilization networks.

As an example of the complexity of renewables, the various biofuels conversion options can collectively convert a wide range of organic matter into electricity, bulk solid, liquid or gaseous fuels, or direct thermal energy. However, the degree of current or potential viability of each option will vary regionally because of resource availability, technology performance, and regional demand profiles.

The varying degree of technical maturity of each option is a second source of analytical complexity. For example, some options, such as power generation using magma as a geothermal energy source, are still theoretical concepts. For this option, extensive research is required to determine the feasibility of using this energy source for power generation. Others, such as hydrothermal dry steam, represent commercial or near-commercial options, subject to only limited improvements through R&D advances.

Industry structure and maturity is a third important source of complexity. For example, in some instances an identifiable industry has established at least an initial market presence such as in solar water heating, and has developed the institutional and financial infrastructure to fund development and manufacturing. In other instances, no identifiable industry exists, as in the case of magma power, or an industry (such as electric utilities) exists but the capital and reliability constraints imposed on it tend to discourage adoption of innovative and risky technologies.

This complexity dictates an evaluation method that explicitly considers the unique aspects of each technology option, while maintaining consistency across all renewable energy technologies. The levels of Federal support requested for the various renewable energy technologies are based upon the results of this type of evaluation. This FY 1987 budget reflects a sound and stable commitment to the continuing development of these technologies. This proposal will increase understanding of the potential for virtually all of the most promising solar energy options and will substantially contribute to the base of technical information required for informed decisionmaking by the public and private sectors.

One of the primary goals of all the applied research areas in Renewable Energy is to effectively transfer technology from Federal and university laboratories to private industry. The earlier industry is involved, and the more directly that the research agenda is guided by the companies' own economic self-interest, the more effective the transfer is likely to be. A funding approach will be explored in 1987 as an effort to increase the private leverage of Federal funds, provide industry with increased involvement in the choice of technology development directions, and help limited Federal funds to support emerging industry more broadly. This approach is to solicit industry interest in joining together to form cooperative R&D ventures within broad sectors of the economy. This ultimately could transform most or all of the industry-performed work in Renewable Energy, and can facilitate transfer of advanced technology to the private sector. Many areas of industry-performed Renewables R&D work offer opportunities for this approach.
Cooperative ventures are potentially suited to this technology-transfer/proof-of-concept stage of activity. By law, and because of the competitive interests of the companies involved, their activity is restricted to precompetitive (i.e., not product-specific) research and development. The cooperative ventures would be designed to meet this criterion. This matches Administration policy of supporting longer-term generic research that benefits the public, but not using tax dollars to subsidize a particular company's development of proprietary products. Support of industry-cooperative R&D allows limited Federal funds to strengthen a whole industry and not just one or a few selected players. This could benefit emerging industries as well as more mature ones.

The voluntary organization of such cooperative ventures by industry would serve as a strong indicator for the proper direction of government-sponsored R&D. The pooled funding will also provide a greater degree of private cost-sharing for applied R&D, allowing Federal dollars to go farther.

If the cooperative venture is defined broadly, with a substantial membership base and level of funding, it can perform or sponsor technology development projects in a number of related areas. This serves to further reduce the risk to the participants, ensuring better chances for shared successes that will repay each party's investment.

The Department will not place tight constraints on the types of cooperative opportunities to be considered, but key characteristics of the concept include:

- Significant leveraging of Federal funding;
- The support that the Department would provide should not displace support that would otherwise come from the private sector;
- The Federal government will share in royalties or other repayment profits from the venture, proportionate to its contribution to the venture;
- Participation of two or more companies;
- Preferably ventures should include companies that have previously proven themselves successful in obtaining and managing co-funding from private sources.

As industry develops responses to this opportunity, the Department will consider reprogramming of monies to allow participation in promising cooperative ventures.

RENEWABLE ENERGY PROGRAM BUDGET

The levels of federal support in the budget for the various renewable energy, energy storage and electric energy systems technologies are considered appropriate given the appropriate Federal role and the need to progressively reduce federal budget deficits in light of the comparative needs and levels of federal funding for various other governmental activities. These levels of investment will provide for continuing progress in completing development of the technology base required for industrial decision making regarding these promising energy supply and management technologies.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

SOLAR ENERGY

The solar programs support research and development that will strengthen the technology base from which industry can draw in developing future new products and processes for commercial market development. The programs support activities ranging from basic research in universities and National Laboratories to applied R&D and proof-of-concept projects by the industrial sector. The FY 1987 budget request for Solar Energy is $72,292,000 which is a $72,332,000 reduction from the FY 1986 adjusted appropriation of $144,624,000.

Reductions in the Renewable Energy R&D programs are proposed in the 1987 Budget consistent with budgetary constraints. In addition, a new innovative cooperative R&D approach will be carefully reviewed and expressions of interest will be solicited from industry. Partnerships with industry-formed cooperative R&D ventures to support longer-term high-risk applied technology development of generic or precompetitive nature, may be an effective method to leverage Federal monies and increase program impact. This approach is intended to promote more effective technology transfer and to allow broader research support within current fiscal constraints.

The 1987 solar energy program will support generic and long-range research in a wide variety of alternative energy technologies, structured to provide a sound base from which industry can draw particular applications. The major areas being investigated, as in past years, are moderate and high-temperature solar heat, photovoltaics, biofuels, wind, ocean thermal energy conversion, and solar building technologies. The main research topics being pursued at universities and national laboratories within these application areas are materials sciences, aerodynamic/ fluid-dynamic modeling, biomass production and conversion technologies component system research, and thermodynamic cycles. Industry will be involved in applied research in these areas. In addition, funds are provided for technology transfer and international cooperative activities, generic resource assessments, and capital improvements at the Solar Energy Research Institute.

Prior Year and Recent Accomplishments

Solar Building Energy Systems

- Completed construction and testing of full-scale thin film polymer collectors with copper alloy absorbers and will complete evaluation and transfer of results to industry.

- Completed testing of the double-effect (2R) regenerative absorption chiller in the cooling mode and performed detailed analysis of the single-effect (1R) regenerative absorption cycle and will fabricate the 1R chiller.

- Completed testing of the heat pipe version of the Integrated Stationary Evacuated Concentrator (ISEC) collector and completed side-by-side testing of the new North-South oriented CPC collector.
- Completed testing of the half-scale parallel passage solid desiccant dehumidifier in the specially constructed test facility and completed testing of an advanced solid desiccant material.
- Completed a single family residential building design handbook for passive cooling load avoidance based upon ventilation and shading strategies.
- Completed the nonresidential passive solar experimental buildings program which shows passive systems supplying one-third to one-half the energy requirements at no additional cost.
- Provided design practitioners with a practical solution for daylighting single story nonresidential buildings.
- Developed multi-layered electrochromic optical switching materials for smart windows that control solar heat gains and losses.
- Completed encapsulation of new phase change thermal storage materials in conventional building materials thereby tripling their capacity for charging and discharging solar heat gain.
- Developed new low-conductance glazing materials and coatings which minimize window heat losses.
- Developed new holographic window films and light guides for advanced daylighting deep in building interiors.

Photovoltaic Energy Systems

- Achieved 8% total area efficiency for an amorphous silicon submodule having an area of 1000 cm2 and an 11% efficient amorphous silicon solar cell.
- Achieved the growth of single crystal GaP on Si for a monolithic concentrator cell device.
- Developed a direct patterning process for solar cell contacts using laser beam surface activation. Electrolytic plating of silver onto the pattern completes the metallization system.
- Produced 57,000 cm2 of dendritic web silicon ribbon in one furnace in a growth cycle less than one week's time. At this point web ribbon will have an economic advantage over ingot and slicing technology.
- Developed and verified an analytical solar cell simulation model which correlates with experimental data to within 3%.
- Achieved a 26% efficient GaAs concentrator cell, a 25% efficient GaAs/Si stacked concentrator solar cell and a 20% efficient GaAs concentrator mini-module.

Solar Thermal Energy Systems

- Performed testing of a three meter diameter stretched membrane concentrator to establish membrane to frame coupling.
- Completed the first two years of the three year power production phase at Solar One.
- Completed molten salt component and subsystem experiments at the Central Receiver Test Facility in Albuquerque, New Mexico.
- Completed data evaluation of the first year of utility ownership and operation of the Shenandoah Solar Total Energy Project.
- Completed evaluation of the parabolic dish module and initiated construction of the Small Community Solar Experiment at Osage City, Kansas.
- Completed evaluation of the parabolic dish module selected for the second Small Community Solar Experiment at Molokai, Hawaii.
- Completed the comparison of solar thermal systems for electric power production.
- Concluded the hemispherical bowl project at Crosbyton, Texas.
- Completed the study of conversion options for Solar One and transmitted the report to the Congress.
- Initiated the transfer and consolidation of the central receiver systems program from Sandia National Laboratories-Livermore to the Sandia Laboratories-Albuquerque.
- Completed the first phase of the Innovative Concentrator contracts and initiated final design, fabrication and evaluation activities.
- Initiated cooperative management and research on Free Piston Stirling Engines with NASA/Lewis Research Center.
- Completed laboratory evaluations of thermochemical reactions and initiated tests of the most promising concepts for energy transport at the Distributed Receiver Test Facility in Albuquerque, New Mexico.
- Terminated support of Brayton cycle engines as not being capable of achieving near and long term program goals.
- Completed operations and maintenance evaluation of the Vanguard parabolic dish module (Advanco concentrator/United Stirling engine) at Rancho Mirage, California.

Biofuels Energy Systems

- Completed successful shakedown operations for 3000 kW combustor/gas turbine generator.

- Conducted full-scale combustion in an operating test facility to enhance MSW combustion efficiency and reduce emissions.
- Conducted laboratory testing of enzymatic hydrolysis to verify parametric analysis.
- Identified candidate short rotation woody species capable of genetic improvements in order to increase average yields of as much as 40 percent.
- Compared first growth yields with regrowth yields of short rotation woody species to document that regrowth yields are 20-100 percent higher.
- Analyzed the formation of trace organic substances (dioxins) during thermal conversion of municipal solid waste (MSW).

Wind Energy Systems

- Developed improved aerodynamic and structural codes to incorporate dynamic stall, turbulence and other unstead phenomena.
- Developed theories to predict effects of small-scale turbulence and initiate field tests investigation of innovative approaches to characterize it.
- Initiated testing of improved airfoils for intermediate size (200 to 600 kW) wind turbines.
- Completed design of 3.2 MW Mod-5 wind turbines.
- Completed variable speed operational testing on Mod-0 and transferred results to industry.
- Initiated a statistical data base on wind turbine fatigue, based with data from cooperative program and test turbines.
- Began design study for advanced horizontal axis test facility to replace the outdated Mod-0.

Ocean Energy Systems

- Completed design and procurement of the vacuum chamber for open-cycle seawater experiments and turbine test article conceptually defined.
- Completed data analysis and evaluation of the 1/3 scale down-the-slope cold water pipe (CWP) tests in Hawaii and developed 2D model to predict CWP loads.
- Completed the modification and test of a pneumatic wave energy conversion machine and initial studies on latent heat OTEC processes.
- Evaluated OTEC mixed effluent discharges using physical model.
- Performed open cycle direct-contact heat and mass transfer experiments.
- Completed detail design of the Seacoast Test Facility upgrade project.

Solar Technology Transfer

- Coordinated arrangements for referral of public inquiries to information and assistance services, including specific notices regarding the scope of responses provided by the DOE Conservation and Renewable Energy Inquiry and Referral Service, the Solar Energy Research Institute and its Technical Inquiry Service, the National Appropriate Technology Assistance Service, DOE's Technical Information Center, and the EIA National Energy Information Center.

- Coordinated the private publication of two books from the Solar Technical Information Program.

- Responded to approximately 40-50,000 public inquiries in FY 1985 on how to use energy conservation and renewable energy techniques.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

Solar Energy
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Approp.	FY 1986 Approp. Adjusted	FY 1987 Base	FY 1987 Request	Request vs Base
Solar Energy					
Solar Buildings Energy Systems					
Operating Expenses	$8,985	$7,700	$7,700	$4,700	$-3,000
Capital Equipment	200	481	481	0	-481
Subtotal Solar Buildings......	9,185	8,181	8,181	4,700	-3,481
Photovoltaic Energy Systems					
Operating Expenses	45,169	39,523	39,523	19,600	-19,923
Capital Equipment	1,000	1,155	1,155	1,000	-155
Construction	8,480	0	0	0	0
Subtotal Photovoltaic.........	54,649	40,678	40,678	20,600	-20,078
Solar Thermal Energy Systems					
Operating Expenses	33,395	25,596	25,596	15,300	-10,296
Capital Equipment	500	289	289	0	- 289
Subtotal Solar Thermal........	33,895	25,885	25,885	15,300	-10,585
Biofuels Energy Systems					
Operating Expenses	29,031	26,749	26,749	11,600	-15,149
Capital Equipment	1,000	577	577	600	23
Subtotal Biofuels............	30,031	27,326	27,326	12,200	-15,126
Wind Energy Systems					
Operating Expenses	28,155	24,055	24,055	8,080	-15,975
Capital Equipment	200	770	770	170	- 600
Subtotal Wind................	28,355	24,825	24,825	8,250	-16,575
Ocean Energy Systems					
Operating Expenses	4,008	4,811	4,811	2,500	- 2,311
Subtotal Ocean...............	4.008	4,811	4,811	2,500	- 2,311
International Solar Energy Program					
Operating Expenses	500	962	962	500	- 462
Subtotal International.........	500	962	962	500	- 462

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
Solar Energy

	FY 1985 Approp.	FY 1986 Approp. Adjusted	FY 1987 Base	FY 1987 Request	Request vs Base
Solar Technology Transfer					
Operating Expenses	5,100	2,983	2,983	1,950	-1,033
Capital Equipment	0	0	0	50	50
Subtotal Tech. Transfer	5,100	2,983	2,983	2,000	- 983
Solar Energy Research Institute					
Capital Equipment	0	251	251	315	64
Construction	0	1,993	1,993	230	-1,763
Subtotal SERI	0	2,244	2,244	545	-1,699
Program Support					
Operating Expenses	1,000	1,251	1,251	897	- 354
Subtotal Program Support	1,000	1,251	1,251	897	- 354
Resource Assessment					
Operating Expenses	0	914	914	700	- 214
Capital Equipment	0	48	48	0	- 48
Subtotal Resource Assess.	0	962	962	700	- 262
Program Direction					
Operating Expenses	4,864	4,516	4,516	4,100	- 416
Subtotal Program Direction	4,864	4,516	4,516	4,100	- 416
Total					
Operating Expenses	$160,207	$139,060	$139,060	$69,927	$-69,133
Capital Equipment	2,900	3,571	3,571	2,135	-1,436
Construction	8,480	1,993	1,993	230	-1,763
Solar Energy	$171,587	$144,624	$144,624	$72,292	$-72,332
Staffing - Total FTE	77	88	88	70	18

Authorizations:
o P.L. 93-473, Solar Energy Research, Development and Demonstration Act
o P.L. 93-577, Non-Nuclear Energy Research and Development and Demonstration Act
o P.L. 95-390, Solar Photovoltaic Energy Research, Development and Demonstration Act
o P.L. 95-911, Department of Energy Organization Act
o P.L. 96-294, Energy Security Act
o P.L. 96-310, Ocean Thermal Conversion Research, Development and Demonstration Act
o P.L. 96-345, Wind Energy Systems Act

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
(In thousands of dollars)

Solar Energy

FY 1986 APPROPRIATION ADJUSTED	$144,624
Program increases and decreases	
o Solar Buildings Energy Systems	
- Overall level of effort reduction in Solar Buildings Energy Systems research and development activities	(3,481)
o Photovoltaic Energy Systems	
- Overall level of effort reduction in Photovoltaic Energy Systems reserach and development activities	(20,078)
o Solar Thermal Energy Systems	
- Overall level of effort reduction in Solar Thermal Energy Systems research and development activities	(10,585)
o Biofuel Energy Systems	
- Overall level of effort reduction in Biofuel Energy Systems research and development activities	(15,126)
o Wind Energy Systems	
- Overall level of effort reduction in Wind Energy Systems research and development activities	(16,575)
o Ocean Energy Systems	
- Overall level of effort reduction in Ocean Energy Systems research and development activities	(2,311)
o Solar International	
- Overall level of effort reduction in Solar International activities	(462)
o Solar Technology Transfer	
- Overall level of effort reduction in Technology Transfer activities	(983)
o Solar Energy Research Institute	
- Overall reduction in plant and equipment for operation of SERI	(1,699)

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
(In thousands of dollars)

Solar Energy

o Program Support - Overall level of effort reduction in Planning and Analyses......................	(354)
o Resource Assessment - Overall level of effort reduction in Pesource Assessment activities...........	(262)
o Solar Program Direction - Reduce FTEs by 10..........................	(416)
FY 1987 Budget Request..........................	$72,792

	FY 86 Adjust. Appropriation	FY 87 Request	Net Change
Solar Buildings Energy Systems	$ 6,181,000	$4,700,000	$-1,481,000

The goal of the Solar Buildings Technology program is to advance the engineering and scientific understanding of solar energy, as applied to buildings, and to establish the technology base from which private industry can develop economically competitive solar-related products and designs for use in existing and new buildings. The FY 1987 budget request for Solar Buildings is $4,700,000, which is a $1,481,000 decrease from the FY 1986 adjusted appropriation of $6,181,000.

Research has confirmed that solar energy can be utilized to supply building energy requirements in a large variety of hot water, space heating, cooling and daylighting applications. Conventional building materials and components, as well as energy-related building systems, can be enhanced with improved thermal, chemical, optical and structural properties for the collection, conversion, storage and distribution of energy derived from solar resources. Innovative materials and components can achieve greater control of building heat gains and losses and provide enhanced daylighting at affordable costs and improved durability.

Materials and Components Research

Aperture and building materials research is aimed at improving building apertures to allow control over heat gain or loss. One area of activity aims to prevent heat losses by developing simple, safe and cost effective techniques for creating silica aerogel transparent insulating glazing materials, with minimum light scattering effects. Heat loss through apertures accounts for 25% of the total building heat loss. To control solar heat gain, research will continue towards the development of optical switching films for smart windows which will be durable and cost-effective. Research will continue in the development of holographic gratings which, when applied as film coatings for windows, will redirect daylight over thirty feet into buildings and for developing improved light guide which will transport natural light 30 feet into building interiors.

Thin-film polymer/foil flat plate collectors in the medium temperature range (140°F-180°F) for applications in water heating, space heating, and desiccant cooling systems. Research objectives include achieving efficiencies of 50% at 140°F with very low cost flat plate collectors constructed of thin polymer films and/or metal foils. Funds are requested for the following: (1) analytical and experimental investigations of several candidate polymers to identify degradation mechanisms resulting from exposure to ultraviolet (UV) radiation, elevated temperatures, and moisture; and (2) evaluation of innovative design alternatives.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriaitons

	FY 1986 Conference	General Reduction	Management Initiatives	Pay Cost Restoration	FTE General Reduction	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
Solar Energy (CE)									
Solar Buildings Energy Systems									
Operating Expenses	$ 8,000	$ ---	$ ---	$ -163	$ ---	$ -300	$ 7,537	$ 163	$ 7,700
P&CE	500	---	---	---	---	-19	481	---	481
Subtotal........................	$ 8,500	$ ---	$ ---	$ -163	$ ---	$ -319	$ 8,018	$ 163	$ 8,181
Photovoltaic Energy Systems									
Operating Expenses	$ 47,800	$ ---	$ 6,470	$ ---	$ ---	$-1,807	$ 39,523	$ ---	$ 39,523
P&CE	1,200	---	---	---	---	-45	1,155	---	1,155
Subtotal	$ 49,000	$ ---	$-6,470	$ ---	$ ---	$-1,852	$ 40,678	$ ---	$ 40,678
Solar Thermal Energy Systems									
Operating Expenses	$ 26,600	$ ---	$ ---	$ -123	$ ---	$-1,004	$ 25,473	$ 123	$ 25,596
P&CE	300	---	---	---	---	-11	289	---	289
Subtotal	$ 26,900	$ ---	$ ---	$ -123	$ ---	$-1,015	$ 25,762	$ 123	$ 25,885
Biofuels Energy Systems									
Operating Expenses	$ 27,800	$ ---	$ ---	$ -11	$ ---	$-1,051	$ 26,738	$ 11	$ 26,749
P&CE	600	---	---	---	---	-23	577	---	577
Subtotal	$ 28,400	$ ---	$ ---	$ -11	$ ---	$-1,074	$ 27,315	$ 11	$ 27,326
Wind Energy Systems									
Operating Expenses	$ 25,000	$ ---	$ ---	$ ---	$ ---	$ -945	$ 24,055	$ ---	$ 24,055
P&CE	800	---	---	---	---	-30	770	---	770
Subtotal, Wind	$ 25,800	$ ---	$ ---	$ ---	$ ---	$ -975	$ 24,825	$ ---	$ 24,825
Ocean Energy Systems (OE)	$ 5,000	$ ---	$ ---	$ -37	$ ---	$ -189	$ 4,774	$ 37	$ 4,811
International Solar Program (OE) ..	$ 1,000	$ ---	$ ---	$ ---	$ ---	$ -38	$ 962	$ --	$ 962
Solar Technology Transfer									
Operating Expenses	$ 3,050	$ ---	$ ---	$ ---	$ ---	$ -67	$ 2,983	$ ---	$ 2,983
P&CE	50	---	---	---	---	-50	---	---	---
Subtotal, Solar Technology Transfer (P&CE)	$ 3,100	$ ---	$ ---	$ ---	$ ---	$ -117	$ 2,983	$ ---	$ 2,983
Solar Energy Research Institute (P&CE)	2,332	---	---	---	---	-88	2,244	---	2,244
Program Support (OE)	1,300	---	---	---	---	-49	1,251	---	1,251
Resource Assessment									
Operating Expenses	$ 950	$ ---	$ ---	$ ---	$ ---	$ -36	$ 914	$ ---	$ 914
P&CE	50	---	---	---	---	-2	48	---	48
Subtotal	$ 1,000	$ ---	$ ---	$ ---	$ ---	$ -38	$ 962	$ ---	$ 962
Program Direction	4,900	-161	---	-203	-41	-182	4,313	203	4,516
Subtotal, Solar Energy	$157,232	$ -161	$-6,470	$ -537	$ -41	$-5,936	$144,087	$ 537	$144,624

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriaitons

Solar Energy (CE)	FY 1986 Conference	General Reduction	Management Initiatives	Pay Cost Restoration	FTE General Reduction	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
General Reduction (OE)	$ -161	$ 161	$ ---	$ ---	$ ---	$ ---	$ ---	$ ---	$ ---
Management Initiatives (OE)	-6,470	---	6,470	---	---	---	---	---	---
FTE Reduction (OE)	-41	---	---	---	41	---	---	---	---
Pay Restoration (OE)	-537	---	---	537	---	---	---	---	---
Useo of Prior Year Balances (Solar) (OE)	537	---	---	---	---	---	537	-537	---
Total, Solar Energy	$150,560	$ ---	$ ---	$ ---	$ ---	$-5,936	$144,624	$ ---	$144,624
Operating	$144,728	$ ---	$ ---	$ ---	$ ---	$-5,668	$139,060	$ ---	$139,060
P&CE	5,832	---	---	---	---	-268	5,564	---	5,564

Evacuated tube compound parabolic concentrator (CPC) collectors. Research in this area builds upon previous work that resulted in the development of a very high efficiency, high temperature (200°F-400°F) integrated stationary evacuated concentrator collector with potential applicability in solar cooling and industrial process heating systems. Research is planned on advanced designs that incorporate suggested improvements based on design optimization studies. This includes materials research on high optical efficiency absorber coatings (stable up to 800°F), research on alternative absorber designs and heat transfer fluids, and investigations of various fabrication techniques. Experimental testing of candidate designs to verify the achievement of performance objectives (efficiency = 60% at 350°F); and to monitor operational characteristics (e.g., durability) is also included.

Thermal storage materials. Research directed at improving the thermal storage capabilities of conventional building materials will continue with scale-up tests for thermal performance, durability, toxicity, and reliability of materials, including alkyl hydrocarbons and polyalcohols.

Open-cycle absorption systems materials. The open cycle chiller research includes the analysis of several open-cyle system concepts, development of an efficient integral collector/regenerator prototype, and evaluation of absorption chillers and refrigerant pairs suitable for this application. The operation and experimental evaluation of the prototype system will be undertaken as a part of this research effort.

Systems Research and Development

The Department of Energy has demonstrated that first generation solar buildings can be constructed for essentially the same cost as well designed energy conserving buildings, yet they consume only one-half to two-thirds of the energy. Initially, the program's goal is to extend this knowledge to the four building types that consume 65% of the energy in the nonresidential sector (offices, educational, health care, and retail/wholesale facilities), to multifamily buildings in the residential sector, and to rehabilitation/retrofit applications for all building types. To realize these goals, practical heating, cooling, and daylighting systems must be developed and tested. Research into new heating and cooling technologies and emerging materials and components must be developed, tested and then integrated into optimally functioning systems.

The specific FY 1987 activities that will be conducted are:

Systems research and development (nonresidential buildings). Research directed at providing the buildings industry with practical heating, cooling, and daylighting solutions for nonresidential buildings, in which practitioner confidence is effected through adequate documentation of predictability and proven performance. This would facilitate implementation of these technologies by the buildings industry. The research activities include: (1) Complete development of predictive and analytical tools that describe the energy performance of and occupant response to active heating and cooling systems; (2) Complete development of integrated cooling systems for low/mid rise buildings that utilizes thermal mass in conjunction with ventilative cooling and phase change storage materials; (3) Use validated predictive/analytical tools to develop strategies and controllers that optimally integrate solar building systems; and (4) Continue to monitor, analyze, and evaluate solar buildings systems to determine effectiveness, reliability, and maintainability.

Systems research and development (residential buildings). Research directed at the development of advanced active, passive, and hybrid heating and cooling systems capable of being integrated into the structural systems of multifamily and rehabilitation/retrofit buildings, and guidelines needed to design and integrate these systems with conventional and non-conventional space conditioning systems. This research addresses a need identified by industry for the residential buildings sector, which uses 60% of the energy consumed by buildings. It focuses upon the development of advanced technologies that meet the energy requirements of structurally complex and unique buildings for which existing technologies are inadequate. This research includes: (1) Continued analytical and experimental investigations, of advanced heating and cooling solutions; (2) Experimental analyses of multizone, multistory convective heat and mass transfer, their interaction with HVAC systems, and effect upon occupant comfort; (3) Initial development of guidelines needed to design advanced systems, including hybrid systems and distributed phase change storage materials; (4) Complete development of improved performance prediction and analytical tools; and (5) Continued collection and analysis of system effectiveness data to improve the reliability of solar systems.

Capital Equipment

No new funds are requested for capital equipment.

Photvoltaic Energy Systems

Adjusted FY 1986	FY 1987 Request	Net Change
$40,678,000	$20,600,000	-$20,078,000

The development of photovoltaics is keyed to advances in materials science and technology. Modules based upon crystalline silicon cell materials have been commercially available for a number of years and are now cost effective in high-cost electricity markets. In the past year thin-film amorphous silicon cells and modules have become commercially available from U.S. industries as a result of government/industry collaborative research efforts. This partnership with industry was responsible for re-establishment of a U.S. amorphous silicon research effort and continues in FY 1987 with a cost shared program for the advancement of the scientific base in amorphous silicon-based alloy materials.

In the longer term, it is projected that through cost shared research on thin-films and advanced high efficiency materials, higher-performance lower-cost photovoltaic power systems will become competitive with conventional electric power systems.

Research will emphasize single and multijunction alternatives across three major material groups. The first is amorphous silicon and the alloying elements of hydrogen, nitrogen, carbon, fluorine, germanium and tin. The second group includes high efficiency silicon and gallium arsenide concepts for application in flat-plate and concentrator collectors. Advanced thin film II-VI materials and compound alloy materials such as copper indium diselenide and cadmium telluride constitute the third materials research area. Research on performance, stability, and lifetimes of all three groups involves investigations ranging from material characterization and deposition techniques to module fabrication and test.

A more fundamental photovoltaic research effort will support university research and training, promote the development of new ideas, and explore innovative concepts in materials, device structures, conversion concepts, and characterization methods.

A focused technology transfer effort to assure that ten years of research information is used to the best possible advantage by industry and potential users will be undertaken through technical documentation, workshops and technical symposia.

The FY1987 budget request for photovoltaic energy systems is $20,600,000. This represents a $26,548,000 decrease from the FY1986 adjusted appropriation. Funds totaling $19,600,000 will be used to support the following research areas.

-- Amorphous Silicon for Single and Multiple Junction Cells: R&D activities will be conducted on issues important to cell performance, stability, and fabrication. The work encompasses material selection and characterization; deposition technology; characterization of films, surfaces and interfaces as a function of deposition parameters and methods; measurement of diffusion lengths, minority carrier lifetime, alloying characteristics, and surface and bulk recombination rates; modelling and analysis of materials and cell structures; and comparison with investigations of causes and remedies for light-induced degradation of amorphous silicon cells. Special emphasis will be on multiple-junction amorphous silicon devices using alloying elements including hydrogen, nitrogen, carbon fluorine, germanium and tin. Multiple-junction (stacked) photovoltaic devices offer the possibility of achieving higher efficiencies than single-junction devices. The additional efficiency may more than offset expected additional complexity and thus result in potentially less expensive energy production. These devices will be fabricated as monolithic stacks.

-- High-Efficiency Research: Although the theoretical conversion efficiencies of silicon cells and (III-V)-based cells are greater than 25 percent, the typical value for these materials is less than 20 percent. This activity will support materials, device and modelling research to achieve longer-term one-sun efficiency objectives of 22 percent and 27 percent, for silicon and gallium arsenide, respectively. It will also support research on high-efficiency multiple-junction concepts having the potential to achieve 25 to 35 percent cell conversion efficiencies for application in flat-plate and concentrator collectors. The high-efficiency cell concepts are largely based upon single-crystal, thin-film materials stacked vertically as grown or as placed in a mechanical configuration. The current state of material purity, deposition equipment and interface effects and techniques are all scientific challenges to be resolved. Modelling studies and theoretical analysis are required to guide the device research and the much-needed increases in advanced cell efficiency.

-- Advanced Thin-Film Devices: Single-junction polycrystalline thin-film cells have received federal and industrial R&D attention during the past ten years. Conversion efficiencies of a number of thin-film cells have doubled during this time, but have not reached their projected practical potential. Many R&D opportunities need to be explored to obtain higher-performance (e.g., conversion efficiency, stability and lifetime) and lower-cost cells and modules. Advanced thin-film materials showing the most promise include: copper indium diselenide ($CuInSe_2$) and cadmium telluride (CdTe). The improvements of single-junction cells will be applied to the development of higher-efficiency, multiple-junction cells, which are often based upon combinations of the same materials. The program will continue to support research to produce improved heterojunction (junction formed between two different materials) and homojunction (junction formed by adjacent layers of the same material with different doping) devices based upon compound semiconductor materials. The longer-term goal of more than 15 percent laboratory cell conversion efficiency by 1987 is expected to be met under this project.

-- Photovoltaic Fundamental Research: The objective of this program element is to support university research and training, promote the development of new ideas, and explore innovative concepts having significant interest and potential impact on photovoltaic science and technology. This thrust is aimed principally at projects and efforts expected to make substantial long-range contributions to the advancement of photovoltaic conversion through coordinated basic and applied research conducted by universities in support of the national program goals. Particular attention will be given to the needs of universities in fulfilling their missions and in creating conditions promoting their maximum contributions to the photovoltaic technology base. Research, new ideas and innovative concepts are expected to include new semi-conductor materials, device structures, conversion concepts and characterization methods.

-- Technology Diffusion: The National Photovoltaic Program has amassed a wealth of information from materials to systems during its ten years of research and development. This activity is a focused effort to assure that such research information is used to the best possible advantage by the industry and the user. Through technical documentation, workshops and technical symposia, information will be transferred and further research identified that will bring photovoltaic technology to competitive maturity domestically and internationally.

Capital Equipment

Funds totaling $1,000,000 are needed to upgrade and procure equipment for the Solar Energy Research Institute (SERI) and university laboratories. This equipment is needed to implement (a) new measurement techniques to analyze and evaluate materials and device structures, and (b) improved deposition methods for laying down controlled thin-films of materials to formulate new thin-film devices. In particular, these funds will help maintain SERI at the forefront of photovoltaic materials characterization.

	FY 86 Adjust. Appropriation	FY87 Request	Net Change
SOLAR THERMAL ENERGY SYSTEMS	$25,885,000	$15,300,000	-$10,585,000

The goal of the Solar Thermal Technology program is to advance the engineering and scientific understanding of solar thermal technology and to establish the technology base from which private industry can develop solar thermal power production options for introduction into the energy market. The FY 1987 budget request for Solar Thermal is $15,300,000, which is a $10,585,000 decrease from the FY 1986 adjusted budget of $25,885,000.

Through concentration and heat absorption, solar thermal energy can be converted into electricity or incorporated into products as process heat. Highly reflective surfaces or refractive lenses are arranged geometrically to focus on a receiver which converts the radiant energy into transportable heat. Solar thermal technologies can supply energy for applications over a broad range of sizes and temperatures. Solar thermal energy can also be stored, extending useful operation into non-daylight hours. Another option is hybridization using a fossil fuel combustion source, which increases reliability and offers the benefit of constant power output even at low levels of insolation.

The "National Solar Thermal Technology Program, Five Year Research and Development Plan" outlines federal research activities that will be pursued to achieve the needed technology base from which industry can choose appropriate solar thermal energy options. This plan provides the basis for solar thermal technology planning and reporting. The plan identifies eleven research tasks in three major areas; collection, energy conversion, and systems and applications. The tasks are designed to achieve technical improvements in the most promising solar thermal concepts. With the maturity of the technology progressing well, the Solar Thermal Program is in a position to encourage cooperative venture research and development projects. Three specific collaborative activities to be to be continued in FY 1987 are the development of stressed membrane distributed concentrators (parabolic dishes), scaled up central receiver molten salt receivers and automated control systems.

Collection Technology Research

The energy collection process consists of the concentration and transmission of sunlight by a concentrator such as a heliostat (for central receivers), parabolic dish, parabolic trough, fresnel lens, or other optical concentration device, to a receiver where the sunlight is converted to thermal energy. The collection technologies research areas are; optical materials, concentrators, and receivers.

The objective of this research is to identify and characterize, collection materials and components suitable for stable long-life performance in concentrating solar applications. Concentrating solar thermal technologies have great potential for inexpensive energy production. To better realize this potential; light-weight, high performance reflectors, high-temperature receivers, and concentrators must be evaluated.

The specific FY 1987 research activities that will be conducted are:

- Optical Materials

  Research in optical materials includes identification and characterization of reflecting materials; fundamental evaluation of the failure mechanisms of optical surfaces, degradation mechanisms in polymers, high-absorptivity coatings, high-temperature measurements; and research on refracting optics to determine optical requirements and the appropriate tradeoffs between cost and useful life. The objective is to develop a lightweight reflector that is of comparable quality to a glass mirror. In particular, this means a reflector over 90% reflectivity with a useful life over 5 years. This will be accomplished primarily through research on silvered polymeric reflector materials and a front surface mirror concept where the silver is protected by a solgel compound.

  Concentrators made of silvered polymers or silvered stainless steel have the potential for a substantial reduction in the weight and thus the cost, of the single largest capital cost item of solar thermal systems. The requirement of high-specularity and long-term UV protection is a requirement which is unique to the solar thermal program. This materials research area is aimed at understanding the relationship between the solar flux and the polymer, silver and sol gel. The polymer and sol gel must then be modified to protect the silver reflective surface. Chemical interactions between the silver, polymers, sol gel and stainless steel must be understood and eliminated. Accelerated testing is underway to understand the degradation of polymers from ultraviolet radiation as well as from other environmental factors.

- Concentrators

  Solar concentrators for central receivers, parabolic dishes or parabolic troughs comprise 35-50% of the cost of the system. Maintaining performance while decreasing the cost of concentrators is the biggest single opportunity for bringing the financial risks of solar thermal systems down to a range where private industry can assume control of development. Decreasing the weight of the concentrator has a direct relation to decreasing its cost. Much of the effort in this task focuses on understanding materials' properties, developing mathematical analyses and conducting performance and environmental testing of concentrators to verify those analyses. This effort, done in conjunction with industry, is to determine if the concepts are approaching the multi-year program objectives.

  The specific objective is to decrease the weight of concentrators by at least 55% while increasing the annual efficiency by 5%. The principle concentrator concepts to be investigated include silver/polymer and silver/ stainless membranes and Fresnel lenses. Sufficient progress has been made that it should be possible to use an industry cooperative venture for the development of attractive parabolic dish concentrators. Important in these tasks is gaining an understanding of the force between the new lightweight reflector materials being used and the structures supporting them at various loading conditions. Research will also explore methods of reducing the wind load on a field of concentrators, particularly heliostats and parabolic dishes, through analysis and wind tunnel modelling. Testing and evaluation of stretched membrane heliostats and dishes and innovative point focusing concentrators, began in FY86, will continue.

o Receivers

Solar receivers represent the highest technical risk area in central receiver solar thermal systems. Important heat transfer and thermal cycling data concerning receivers is not well understood: making them both heavy and costly. This task aims at better identifying thermal cycling and loss mechanisms, which will lead to improved thermal and structural designs. The objective is to decrease the technical risks and thus the cost of receivers, principally for central receivers, while maintaining or increasing their annual efficiency. In order to do that, several significantly differing concepts must be evaluated.

One concept is the "optimum" receiver. This concept integrates the thermal analysis on tube and cavity receivers with the lessons learned from the Barstow Solar One and Molten-Salt experiment receivers. This optimum receiver, designed in FY86, incorporates significant changes to reduce technical risks and expands the state-of-the-art in receivers. Testing will be initiated at the CRTF during FY87 and/or at Barstow in FY89. This is another area that offers the possibility of pursuing a cooperative research and development venture. Previous cooperative development projects in this category have been performed on pumps, valves and smaller scale receivers. One highly advanced concept being evaluated is the direct absorbing receiver in which the solar energy is absorbed directly into the working fluid without need of tubes. Such a concept has the potential to increase the efficiency while significantly reducing the material risks of thermal expansion and cycling and the cost of receivers. The concept also has the potential for working at temperatures up to 900±C. Receiver evaluations will consist of thermal modeling to quantify convective and radiative losses, design receivers and conduct preliminary testing at the CRTF.

This task also supports an area of research that may lead to better utilization of the concentrated solar flux. Combustion receiver/reactors will take advantage of high energy photons to initiate certain chemical reactions and the remaining portion of the solar spectrum will provide the heat necessary to complete the reaction. Thus, this task addresses both the need of reducing the risks and the need for broadening the applicability of solar thermal systems.

Energy Conversion Technology Research

The objective of this research is to identify processes and components to convert thermal energy into electricity or other usable energy forms such as fuels and chemicals. It includes thermal or thermochemical processes for transporting energy, and also thermal and chemical energy storage.

The specific FY 1987 research activities that will be conducted are:

- Heat Engines

  Heat engines convert the concentrated solar energy to electricity. The efficiency of the engine is the largest contributor to the overall system efficiency. The engine is also, because of its rotating parts, the most likely part of the system to break down. For the longer term, this task addresses these problems through research into new concepts: which are direct conversion engines with high-efficiency and high-reliability. Although heat engines are used in central receiver system this task area deals primarily with heat engines for parabolic dish mounted applications because of critical problems in that application.

  The objective of this research task is to reduce the expense of dish mounted heat engines below $400/kWe while increasing the annual system efficiency to 25%. It appears that current engines, (organic Rankine, Brayton, and kinematic Stirling cycle) cannot meet the program goals and emphasis has shifted to new advanced engines. The principle engines to be studied are the free-piston Stirling engine, the sodium heat engine (SHE) and the regenerative thermo-electrochemical engine (TECH). These devices convert the sun's energy to electricity with almost no moving parts. All are highly efficient and have the potential for low operating, maintenance and capital costs. In addition, they operate over different temperature ranges which makes it possible to combine two engines to provide an overall efficiency (heat to electricity) of nearly 50%. Research will continue to determine their technical feasibility and on integrating them into solar systems. Technical problems will have to be solved in system control, short-term energy storage, and containment materials.

  Additional tasks will continue evaluations of organic Rankine and other engines as needed to support the testing phase of the Small Community Solar Experiments at Osage City and Molokai. This support will insure that the experiments are successful. Since these engines are still in the development stage it is anticipated that they will have periodic maintenance problems, such as oil or gas leaks, bearing failures, or control breakdowns that need to be addressed.

- Direct Conversion Devices

  Solar thermal systems have been used to convert concentrated solar energy into heat which is then used directly for an industrial process or converted into electricity via a heat engine. Preliminary research has indicated that other (perhaps unique) characteristics of concentrated solar flux can result in other high value applications. This research does not degrade all of the solar spectrum to heat, but separates the high energy photons for direct use. It is expected that this small percentage of the spectrum will have a large effect on many processes. Most of the spectrum is still used to produce heat for an endothermic type of reaction.

The objective of this research task is to more completely utilize the unique properties of concentrated solar flux. High energy photons in the UV and near-UV portion of the spectrum may be able to initiate a variety of chemical reactions not possible by other sources of energy. This, and other unique properties of concentrated solar flux, may provide new applications for solar thermal systems. Research will continue into the basic interaction of flux on materials and various chemicals in order to determine how the energy is transferred. In addition, research will continue to determine if the very high heat transfer rates produced by solar thermal systems can benefically alter the reactant path of chemical reactions. Examples of the applications being studied in this task include the solar detoxification of hazardous organic wastes and the photo-catalytic formation of ammonia from air and water. These would be entirely new applications of solar thermal energy: the direct coupling of the flux to the chemical reaction. Related research is also conducted to shift and separate the solar spectrum so those particular portions that are most beneficial to a particular reaction can be maximized and used efficiently.

o Transport and Storage

Solar energy is intermittent and periodic by nature. Storage allows the system to operate continuously during cloudy periods and additional storage can extend the period of operation into night-time hours. Long-term storage is important because it allows solar systems the flexibility to meet the needs of the user: whether it be a chemical plant or utility. As long as solar systems can operate efficiently only during daylight hours they will have a sharply restricted applicability. Thermochemical processes offer the potential for an efficient storage and transport that would greatly enhance the efficiency and flexibility of solar thermal systems.

The objective of transport and storage research is the evaluation of transport and storage systems that can provide an effective match between the fluctuating solar energy resource and the thermal, electrical or chemical load demand. The two primary methods of energy transport and storage are thermal and chemical. This task in FY87 is concerned primarily with chemical transport and storage. Chemical storage/transport has the advantage in that the chemicals are stored and transported at ambient temperature, thus eliminating much of the thermal losses.

The key to the feasibility of this is the efficiency of the endorthermic reaction at the solar receiver and the exothermic reaction at the point of application. Research during FY87 will determine these efficiencies through the test of experimental reactors. Depending on studies conducted in FY86 either the CH4/CO2 reforming or SO2/O2 reactions would be used. Problems that must be addressed include catalyst degradation, thermal cycling of materials and control of side reactions. An additional task in the thermal storage area looks at methods of reducing the risks of transporting and containing high-temperature molten salt from central receiver applications.

Systems & Applications Technology Research

The objective of this research is to conduct system evaluations and parametric and comparative analysis at an early stage to assess the potential of alternate concepts, and to define critical technology and component issues. This research effort includes the evaluations of existing designs, components, subsystems and systems. Support for scientific and engineering experiments are included as necessary to achieve program goals.

Research areas include: 1) the assessment of innovative concepts and applications; 2) balance-of-plant components; 3) the analysis, design, and experimental testing of central and distributed receiver subsystems and systems at research facilities and also: 4) support for the design, construction, operation, and evaluation of complete systems at user locations.

The specific FY 1987 research activities to be conducted are:

- Balance of Plant

  Reducing operating and maintenance requirements are critical in solar thermal systems. This becomes increasingly important as the size of the plant decreases. For a small solar thermal plant to be economically competitive, unattended operation and monitoring is probably necessary. This task is intended to address that issue by applying state-of-the-art artificial intelligence technology to solar thermal systems. This task also studies the maintenance requirements of the systems to keep the plants operating at maximum efficiency and reliability.

  The objective of this research task is to minimize the risk and expense associated with the operation and maintenance of solar thermal systems; principally through the development of innovative maintenance approaches and control systems that would allow for unattended operation. Rapid advances in electronics and artificial intelligence makes it possible for state-of-the-art sensors and computers to monitor and control the thousands of heliostats or parabolic dishes and other components and subsystems that make up a solar system. Experimental control systems will be designed and evaluated to support the Small Community Solar Experiments and the central receiver system experiments at the CRTF. These applications are representative of small dish and central receiver systems and are likely to be cooperative venture projects with industry cost sharing. Maintenance concepts, such as concentrator cleaning methods, improved heat tracing, and more routine maintenance requirements, will be evaluated to improve system performance and reliability.

- Central Receiver Systems

  The general objective of this research task is to determine the technical applicability of small-scale central receiver experiments to full size systems. Testing of small-scale hardware is vitally important to provide solutions to "real world" problems that do not show up in the laboratory environment. It is through these tests for example, that many materials problems first surface. These tasks also give industry and utilities confidence that the technology is appropriate to their application. The ability of the researchers to prove the scaleability of their test results to larger systems is key in convincing these users that the technical risks are understood and can be overcome without further scientific breakthroughs. This task is thus a form of technology transfer from government to industry of central receiver hardware concepts that have proven to be technically feasible.

Central receiver system research activities include the development of designs, the analysis of system parameters and the experimental testing of groups of components, leading to the evaluation of prototype subsystems and systems. To support these objectives small scale experiments of central receiver components and subsystems will be designed and conducted at the CRTF to verify such items as the scaleability of heat losses, heat tracing and receiver tube. Mathematical analysis, including computer code development, will integrate advanced components into a system for concept comparison and to provide guidance for future research. One such study, completed in FY86, determined the feasibility of high-temperature systems. This study for example influenced the direction of the task on "Receivers". Another major activity will be tradeoff and conceptual studies to support the determination of the next appropriate step in central receiver technology.

o Distributed Receiver Systems

Laboratory tests are not able to exactly simulate the solar spectrum nor the environmental conditions that field hardware must actually withstand. Tests at the DRTF are thus valuable from a diagnostic point of view. Hardware performance is also used to verify the mathematical analyses and computer codes that were used in each design stage. This correlation of theory and working modules is a key factor in convincing industry and utilities that the technical risks are understood and can be overcome.

The objective of this research task is the verification of mathematical analyses of distributed receiver systems (dishes and troughs) through laboratory and DRTF testing and evaluation. The dish module for the Small Community Solar Experiment at Molokai, Hawaii will be tested during FY87 before it is approved for Molokai. Analyses will be conducted comparing the performance of dish modules to the requirements for reflector accuracy, and structural rigidity, and the usefulness of terminal concentrators for a variety of operating temperatures.

o Systems Experiments

System experiments at user sites provide data on capital and O&M costs, performance, reliability and operations and maintenance techniques and problems of solar thermal systems. Experiments are conducted with significant cost-sharing from equipment manufacturers and potential users. Such experiments support the achievement of technical and economic feasibility and are intended to provide the final impetus for industry to commit to full development of the technology.

The objective of this task in FY 1987 is to evaluate data generated from system experiments at the Solar One Pilot Plant at Barstow, California and the Small Community Solar Experiments at Osage City, Kansas and Molokai, Hawaii. This data provides valuable insight into the long-term material and component problems that may not have been predicted in laboratory tests or prototype evaluations. Most of the funding in this task is the DOE contribution to the Solar One cooperative agreement for operations and maintenance of the facility.

Planning and Assessment

The objective of this activity is to conduct program integration, assessment, comparative analysis and specific technology transfer activities such as program documentation and periodic contractor review meetings. Solar thermal activities will be continued to support implementation of the Five-Year Research Program Plan.

DOE

	FY 1986 Est. Approp.	FY 1987 Request	Net Change
BIOFUELS ENERGY SYSTEMS	[illegible]	[illegible]	[illegible]

The goal of this program is to conduct a balanced research effort aimed at providing the generic technology base for industry in the areas of feedstock production and conversion. The objective is to promote early transfer of technology to the private sector by verifying technical feasibility/readiness of combined feedstock production and conversion technologies through cost-shared projects.

The purpose of Short Rotation Intensive Culture research is to establish the technology information base needed to enable the private sector to increase the production of wood energy feedstocks [illegible] [illegible] [illegible] [illegible] [illegible] rotation intensive culture (SRIC) of woody crops. The objective of increasing potential productivity will be approached through genetic improvement combined with advances in developing cultural management strategies. Biological evaluation of management alternatives includes evaluation of [illegible] [illegible] (coppice) following harvest and assessment of disease and pest risks. The objective of improving the economics of SRIC will be addressed [illegible] [illegible] through identification of efficient cultural strategies using improved genetic material and through evaluation of optimal [illegible] [illegible]. Various [illegible] [illegible] that SRIC of woody crops is a technology which, once developed by the private sector has the potential to supply wood [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] supply of competitive prices [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

Genetic improvement of species offers the greatest potential for increasing the productivity of SRIC. [illegible] genetic selection [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] additional productivity gains of up to [illegible] are possible through genetic improvement. [illegible] [illegible] [illegible] [illegible] for genetic selection and [illegible] hybridization.

Prior research indicates that coppicing results in productivity gains of at least [illegible]. However, additional data are needed to [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. These management techniques will be evaluated, and [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] potential will be identified. [illegible] will be [illegible] [illegible] [illegible] techniques for increasing coppice growth and [illegible] [illegible] [illegible] [illegible]. Successful coppice growth is a [illegible] [illegible] [illegible] [illegible] of SRIC.

Monoculture stability studies will be conducted to determine the biological risks of growing single species of [illegible] [illegible] [illegible] cultural conditions. In particular, susceptibility to diseases and pests will be identified, and [illegible] [illegible] will be determined. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] to these experiments.

Nutrient conservation studies will address the environmental impacts of SRIC-caused nutrient depletion on [illegible] [illegible] [illegible]. [illegible] of nutrient cycling mechanisms under a series of management approaches will be conducted to determine the best management regime for reducing costs and maintaining site productivity over the long term. Critical nutrient elements will be identified and amelioration strategies evaluated.

The purpose of Herbaceous Energy Crops research is to provide the technology base that will allow the private sector to develop commercially viable systems for producing herbaceous biomass for fuels and energy feedstocks. The program focuses on lignocellulosic crops suitable feedstocks for biochemical and thermochemical conversion systems. In addition, effort will be devoted to oilseed crops. Analysis has indicated that herbaceous energy crops grown on marginal lands have high potential for a significant energy contribution and is a research area of high priority.

The goal of the Herbaceous Energy Crops program is to obtain yields of up to 12 dry tons/acre/yr. Experiments designed to select species or cultivars with high productivity on marginal croplands and to define promising approaches to production systems will be performed. In addition, experiments on the use of breeding systems for selecting and improving species for use on sites with specific chemical or physical limitations to production will be conducted.

In FY 1987 oilseed crop research emphasizes breeding and testing of new varieties of winter rapeseed for liquid fuels. Resistance to the herbicide atrazine will be bred into varieties of winter rapeseed whose fatty acid composition has been adjusted to maximize the fuel value, permitting the control of weeds related to rapeseed in rapeseed fields. Limited variety trials designed to establish planting dates, harvesting dates, and yields for rapeseed varieties will be evaluated.

The purpose of Aquatic Species research is to improve the productivity of microalgal species, and the efficiency of conversion processes for these species, to the extent that private industry will develop these technologies for liquid fuels. Microalgae are widespread in nature, possess rapid growth characteristics and diverse chemical composition, and provide a potential resource base for producing renewable fuels. Microalgae production is designed to provide a domestic source of high-energy liquid fuels, such as gasoline and diesel fuels, which complement and contribute diversity to the Nation's overall energy mix. Research will focus on selecting and improving strains of microalgae to provide high, sustainable yields of fuel products in outdoor mass culture.

FY 1987 funds for microalgae will be used for those research areas identified as critical for further advancement of the technology: species screening, species improvement and outdoor culture strategies. In the species screening area, effort will be directed to complete characterization of strains for lipid yields, growth potential, and environmental tolerance. Carefully characterized strains will lead to selection of species on which to concentrate species improvement activities. The critical issues are: isolating species which possess high growth rates and high lipid production and isolating organisms with high growth rates at low temperature.

One goal of microalgae research is to improve lipid production from 20-30% of the organism by weight to 50-60%. In an effort to produce strains of microalgae with the ability to produce a larger percentage of lipids, research into the regulation of lipid synthesis will be conducted.

Mass culturing of microalgal species in small outdoor experimental facilities is imperative to the advancement of this technology. The objectives of this research are to verify the performance of laboratory-selected species in an outdoor setting and to devise strategies for maintaining high yields of lipids in the mass culture environment. Sensitivity to temperature and light are critical variables.

Thermochemical conversion will focus on the production of liquid fuels from biomass and the thermochemical processing of municipal solid waste. Liquid fuels have higher energy density than biomass feedstock and are able to be transported more economically and to be more easily stored. Liquid fuels also match existing end-use patterns, particularly in the transportation sector. Research in this area will be directed at identifying reaction pathways and methods for producing high-value liquids fuels and on improving yields and quality of liquid fuels. Municipal solid waste (MSW) research will continue to address the production of liquid and gaseous fuels by thermal processes, as part of the overall goal of assisting industry develop sound technologies for the productive use of municipal wastes.

In FY 1988 a major thrust of the biomass portion of this program element dealt with medium-Btu gasification. An industrially cost-shared experimental facility of 50-200 tons/day capacity will be constructed with FY 1988 funds and serve as a centerpiece for medium-Btu gasification. Industry is expected to assume responsibility for further applications development.

In the liquid fuels research area, fast pyrolysis and pressurized catalytic liquefaction will be evaluated in continuously-fed bench scale reactors and in process research units. This research will provide important information required for determining some of the necessary process conditions and expected yields of biocrude oils. The concept of fast pyrolysis has emerged as a promising alternative for producing liquid fuels. Using rapid heating rates, yields of gases and liquids as high as 95% can be produced. These products contain up to 20% high-value olefinic products such as ethylene and aromatics such as benzene, toluene, and xylene, which are potentially useful as fuels and octane enhancers. The pyrolysis research will focus on investigating extremely fast pyrolysis to maximize yields of high-value octane enhancers improving the yields of fast pyrolysis by conducting the reactions in an atmosphere of a reactive gas, and using fast pyrolysis to produce high yields of fuel oil substitutes.

Laboratory research will be conducted on the thermal stabilization of pyrolysis liquids with emphasis on reaction concepts for manipulating the decomposition reaction mechanisms of these unsuitable oils to prevent polymerization into heavy tars. Experiments will examine those process conditions which contribute to the production of paraffinic hydrocarbons in the desired boiling range in preference to the aromatic hydrocarbons.

The pressurized catalytic liquefaction research focuses on using a unique extruder/mixer design to investigate direct conversion of biomass to liquid fuels. This research will also provide the necessary feedstocks for research on refining these oils into gasoline compatible fuels.

Municipal solid waste research will focus on developing basic kinetic data for thermal liquefaction and gasification. The research is aimed at defining the primary and secondary chemical reactions, identifying some of the important operating parameters and how they influence the reactions, and producing a useful kinetic model that can be used by industry for design of efficient reactors to produce gaseous or liquid fuels. The scientific basis of heat transfer in MSW will be examined in order to establish fundamental data necessary for the design of efficient reactors.

FY 1987 funds will also be used to examine the most serious current problem in the implementation of emerging MSW thermochemical technologies as identified by industry, i.e., the understanding and control of trace chlorinated hydrocarbons. Research will address the understanding of chlorine sources, conversion and destruction of trace pollutants and, as an added energy bonus, the understanding of the combustion kinetics of MSW which is expected to lead to a 5% increase in the efficiency of waste-to-energy processes. In the MSW feedstock preparation area, research will focus on integrated models of preparation systems and the development and testing of suitable binders. The successful development of refuse-derived-fuel (RDF) from MSW will lead to cofiring of RFD in existing boiler facilities.

Research in biochemical conversion will be performed to provide the technology data base for conversion of cellulosic and lignocellulosic materials from renewable resources into high-value liquid and gaseous fuels. Effort will focus on the biology of microbial processes for enhanced product yields, high conversion efficiencies, and rapid kinetics of reactions, all of which will contribute to viable processes for alcohol fuels and methane-rich gases. Funding in FY 1987 for alcohol fuels will advance the technology for competitive production of octane enhancers and additives for transportation fuels. Further developments in alcohol fuels research have the potential to lead to neat transportation liquid fuels competitive after the turn of the century. The anaerobic digestion of dedicated feedstocks, biomass grown specifically for the digestion process, and municipal solid waste are high risk research areas with potential for significant pay-off. FY 1987 funds will be used for anaerobic digestion research to reduce the technical risks and enhance private sector involvement. Increased conversion efficiencies, improved rates of digestion and fermentation, and better pretreatment methods are research areas where improvements are targeted to sufficiently reduce risks to attract private sector investments.

FY 1987 ethanol production research will focus on conversion of the hemicellulose fraction of wood to ethanol, improvements in the yield of ethanol from cellulose, and conversion of lignin to liquid fuels. Available yeasts cannot convert the five carbon sugars present in hemicellulose to ethanol. Genetically modified yeasts to perform this conversion will be examined, potentially increasing the ethanol yield by about 40 percent per unit weight of wood processed. To improve the performance of enzymatic hydrolysis, chemical pretreatments will be tested to determine their ability to improve the conversion efficiency in various hydrolysis/ fermentation schemes. Research will be directed at cellulose enzymology to increase the productivity of enzyme producing organisms and, furthermore, increase the activity of the enzymes produced. This work will also include research on enzyme recycle. Increasing enzyme productivity and activity, as well as, enzyme recycle have been identified as major cost cutting steps to any enzymatic hydrolysis process. In FY 1987 a selection will be made to persue one of the three acid hydrolysis processes currently under study. In FY 1987, research will address the transformation of lignin into octane enhancers and liquid transportation fuels, as well as there use in integrated process schemes to produce liquid fuels in order to use the 20-35 percent of a tree that is lignin.

The focus of the biochemical conversion of biomass to methane rich gases will be to enhance stability and control of anaerobic digesters with dedicated herbaceous crops as the feedstock. This research will enhance the favorability of digester construction and operation, thus eliminating the need for back-up systems and oversizing for safety. For efficiency, the digester must be operated at close to maximum loading rate as possible. Research is needed to determine the biological markers that indicate digester failure, then control systems can be designed that will permit operation at nearly maximum levels. In order to meet the objectives of enhanced stability and control, monoclonal antibodies will be developed for specific organisms in the microbial consortium. These biological markers will allow populations of individual organisms to be monitored before, during, and after digester failure.

Biochemical conversion of municipal solid waste will focus on processes that biologically convert MSW to gaseous fuels. Research will address understanding the life-cycle of microorganisms involved in anaerobic digestion and the modification of these organisms to enhance their productivity. The understanding of the biochemistry and physiology of the ecosystem is essential in the study of methanogenesis for improved digester performance. Research on this cost-shared project will involve methods for injection of refuse derived fuel into the digester, filter care dewatering tests, and optimization of solids content. The private sector is expected to embark on a commercialization of this process pending outcome of the remaining R&D.

FY 1987 funds for capital equipment will be used for analytical equipment and laboratory scale apparatus to suppdrt research in biofuels production and conversion. The funds will be equally divided between production and conversion research.

	Adjusted FY 1986 Approp.	FY 1987 Request	Net Change
Wind Energy Systems............	$24,825,000	$8,250,000	$-16,575,000

The principal objective of the Wind Energy Program is to improve the understanding of fundamental atmospheric processes and their effects on wind turbines and to translate this understanding into tools that the industry can use to design and operate cost-competitive wind turbines. The proposed FY 1987 budget continues the industry/government partnership defined in the recent multi-year plan. The cost, performance and structural lifetime of today's wind turbines must be improved substantially for the industry to be cost-competitive over the long-term. The FY 1987 request for Wind Energy Systems is $8,250,000. This represents a $16,575,000 decrease from the FY 1986 adjusted appropriation of $24,825,000.

The DOE R&D program is structured to assist industry in these developments with two major technical thrusts. The first element is Basic Science of Wind Turbine Dynamics. This thrust includes efforts to understand the random nature of the wind, its complex interaction with the wind turbine rotors, and the effects of this interaction on performance and reliability. The second thrust is Advanced Components and Supporting Research. It is structured to assist industry in identifying promising advanced concepts, such as high performance airfoils.

The FY 1987 request reflects a revised budget structure to implement the above strategy. The majority of the effort included in previous years in the aerodynamics and structural dynamics research elements related to improved understanding of fundamental processes is now in respective subelements in Basic Science of Wind Turbine Dynamics. Similarly, research on advanced airfoils is now proposed under the Advanced Components and Supporting Research element.

Major changes in the request include the completion of vertical axis research in FY 1987 and the phase-out of Mod-5B in FY 1986.

Implementation of research is undertaken through universities, industry, and Federal laboratories, including the consolidated Wind Energy Research Center at Rocky Flats operated by SERI.

BASIC SCIENCE OF WIND TURBINE DYNAMICS

This element is the major technical effort in the DOE wind program and reflects the program structure in the recent multi-year plan. Its subelements are atmospheric fluid dynamics research, aerodynamics research and structural dynamics research, and efforts are focused on improved understanding of how a turbine produces energy.

Atmospheric Fluid Dynamics Research

The need for improved understanding of the local behavior of the wind is demonstrated by experience at windfarms and DOE experimental turbines. In windfarms, many turbines perform poorly, while others experience blade fatigue failure after 2 to 3 months. The major drivers of these operating problems are turbulence induced loads, local (micro-scale) windflow variability and shear, and turbine- to-turbine interaction through the wake of the upwind turbine. These research issues are addressed in this element.

o Microscale Turbulence

Turbulence is a primary driver for fatigue loads experienced by a wind turbine. It is also a very complex phenomenon that varies widely, both spatially and temporally, and is hard to quantify because it is difficult to visualize. Existing models do not satisfactorily represent the stochastic properties of turbulence. DOE research experience and the operational histories of commercial windfarms indicate that turbines with adequate lifetimes cannot be built without a full understanding of turbulence and its influence on aerodynamic lift and structural loads.

Projects proposed will continue rotational sampling research to better represent the wind that a rotating blade encounters and will include basic characterization of the free stream wind input to the turbine, modification of the turbulent wind by the rotor, and improvement to the stochastic wind turbulence models.

o Local Flow and Performance Variability

The performance of individual machines at existing windfarms in complex terrain can vary significantly due to the influence of hills and obstructions at nearby sites. The ability to predict wind speed and direction variations at individual sites would be a great assist to a windfarm developer. Recent progress in verifying a mass-consistent wind flow model with digitized terrain input suggests that this technique is feasible. It would allow turbine installers to avoid siting turbines in locations with especially turbulent or marginal winds. Requested funds would support field validation and theoretical extensions of the models by conducting a multi-site wind measurement program at several locations in mountainous terrain with differing climatic characteristics.

Aerodynamics Research

Understanding the aerodynamic processes that convert the kinetic energy of the wind into mechanical and electrical power is the principal challenge facing the wind energy research community. It is made complicated because the wind input is turbulent, the aerodynamic processes are themselves unsteady and produce turbulence, and radial flow may occur along the blade. Major areas of research include unsteady flow and aeroelastic theories, aerodynamic performance code improvement, and cooperative research with industry. This research is generic in nature and generally independent of turbine size and configuration.

o Unsteady Flow and Aeroelastic Theory

Unsteady aerodynamic effects are believed to be a primary cause of inaccurate prediction of lift and stress in wind turbines and resulting uncertainties in fatigue life and system reliability. In wind tunnel tests on airfoil sections operating with rapidly changing angles of attack representative of turbine operation, dynamic stall has been shown to produce widely varying lift coefficients. The effects of three dimensional flow along the blade are particularly difficult to model or simulate, but are likely to be a significant source of error in predicting stall and performance of intermediate turbines. These factors can not currently be simulated in wind tunnel tests. Requested funding would support advanced wind tunnel testing and refinement of theoretical models.

o Improved Aerodynamic Codes

Existing aerodynamic computer codes are very large, complicated to use, and underpredict cyclic lift and drag forces by as much as a factor of two. Key refinements to reflect dynamic stall, turbulence and three dimensional flow are needed. Requested funding would provide for upgrading computer codes, and simplification where possible, using theoretical extensions developed in the previous subelement.

o Cooperative Research with Wind Turbine
Manufacturers and Windfarm Developers

Cooperative research with industry is a key element of the Federal Wind Program. A large body of research data is potentially available from the 8000 or more wind turbines installed in windfarms by the end of 1985. Building on approximately 5 projects started in late 1985, and 5-10 in FY 1986, this subelement permits improvement and validation of aerodynamic and structural theories developed over many years and expedites information exchange between government and industry. These projects are awarded competitively, with maximum industry cost-sharing and minimal Federal paperwork. Tests will be conducted using specially instrumented commercial machines to obtain actual operating data collected in a wide range of environments. This "real world" information will be used to improve understanding of turbulence, aerodynamic performance, wakes and micro-siting, and supporting research.

Structural Dynamics Research

The objective of the structural dynamics research element is to improve understanding of how aerodynamic loads induce structural stresses and resulting fatigue, and, to develop and validate computer codes to permit industry to design wind turbines with a 20 to 30 year life. Current machines have been shown to develop blade problems in less than 3 years, far short of their design life. The reasons for this are not well understood.

Structural design of a wind turbine, given the severe operating environment, particularly with respect to fatigue, is a very difficult task. It requires understanding of the wind as a forcing function, aerodynamic and electric power system processes acting on the structure and how the structure responds. Sources of deterministic loads, i.e. gravity, centrifugal forces, average wind, and start-up/shut-down cycles, are reasonably well understood and modeled satisfactorily. However, loads generated by turbulence and unsteady aerodynamic processes are not well understood and are a key uncertainty. Methods of predicting ultra-high cycle fatigue lifetime for wind turbines are limited in capability and confidence levels.

o Frequency and Time Domain Models

Improvement of structural models to reflect the wind turbulence input, time varying aerodynamic loads, and variable rotor speed operation is essential to the design of cost-effective systems. Modeling interactions among the principal turbine components--blades, rotor, drive trains, and tower--and their interactions with the wind and the electric utility system is the principal role of structural dynamics. This activity becomes more difficult as turbine configurations are revised to get "softer" to reduce loads. Frequency domain models are used to predict natural resonant frequencies and to tune the operating profile to avoid frequencies that are not well damped.Time domain models are more complicated, but are needed to represent the wind as a forcing function and the utility system as a host. Requested funding will provide for analysis of structural data from the cooperative research program. A major thrust is incorporation of turbulence and unsteady aerodynamics into models to improve predictions of stress and fatigue.

o Load Phasing and Fatigue Prediction

Fatigue life projections for wind turbines are subject to gross errors because current understanding of turbulence-induced loads is poor. While progress in rotationally sampled wind research has shown that turbulence on a scale of one blade chord length, rather than a rotor diameter, is significant, there is little understanding of the correlation of turbulence induced loads along a blade. This lack of information applies to both vertical and horizontal axis systems and is needed to improve structural loads models. Funding is requested to support pressure distribution and hot film anemometer testing on experimental and commercial horizontal axis turbines to provide data for improvements in models. Methods of fatigue prediction will also be compared.

ADVANCED COMPONENTS AND SUPPORTING RESEARCH

Advanced components and supporting research involves activities in two areas: advanced subsystems (e.g. airfoil, generators and control systems) and supporting research such as aeroacoustics, utility impacts and program planning.

In the advanced components area, efforts are focused on generic, proof-of-concept activities that make use of Federal research results, the most important of which is advanced airfoils. Most of the existing data on airfoils are on planforms that are intended for aircraft wing, propeller or helicopter rotor applications. Most of these designs are ineffective on wind turbines. This research effort will attempt to fill that gap. Similarly, the supporting research subelement cuts across turbine and disciplinary lines in providing program planning, environment impact studies, analysis of electrical problems associated with operating wind turbines in existing power grid systems, and other research which relates to generic applications of wind systems.

o Advanced Airfoils

Virtually all wind turbines to date have used aviation-oriented airfoils designed for a much more limited range of angles of attack and higher Reynolds numbers than characteristic of wind turbine operation. Recent wind tunnel results indicate that a 20-50 percent improvement in performance and desirable structural characteristics are possible by designing airfoils specifically for the wind turbine environment. Requested funding would continue development of families of horizontal and vertical axis wind turbine airfoils.

o Variable Speed Generation

The potential benefits of variable rotor speed operation are improved energy capture, reduced cyclic stresses, and improved control that offer significant improvement in wind turbine operation. Variable speed operation is considerably more complex than fixed rotor speed operation and industry lacks the necessary design tools at present. The DOE program is structured to develop this information to allow industry to evaluate alternative concepts. Requested funding will continue laboratory and field tests of various variable speed concepts.

o Supporting Research

The supporting research subelement includes planning and assessments, technology transfer activities, windfarm power quality, wind/diesel hybrid research and environmental studies on TVI and noise. Results from the general research program are applied in development of International Energy Agency Recommended Practices and in support of industry standards. Requested funding supports these private sector efforts and provides for systems and economic analyses, workshops and seminars, Historically Black College and Universities (HBCU) research activities and preparation of a wind turbine design handbook.

CAPITAL EQUIPMENT

The FY 1987 request for capital equipment of $170,000 will be used for research test equipment and data acquisition systems at selected laboratories.

	Adjusted FY 1986 Approp.	FY 1987 Request	Net Change
Ocean Energy Systems	$4,811,000	$2,500,000	$-2,311,000

The oceans, covering 71 percent of the earth's surface, collect and store massive amounts of solar energy. Ocean Thermal Energy Conversion (OTEC) is a form of ocean energy which is renewable, capable of furnishing tens of quads per year, and available 24 hours a day, all year long. OTEC also has the potential to produce a variety of energy intensive by-products such as mariculture, fresh water and air conditioning while simultaneously producing energy. Wave energy, although not viewed as being as promising as OTEC in resource potential or availability, is attractive for its potential application to some geographical areas which do not have an OTEC resource. The FY 1987 budget request for Ocean Energy Systems is $2,500,000. This represents a decrease of $2,311,000 from the FY 1986 adjusted appropriation of $4,811,000.

The objective of the ocean energy program is to develop a generic technical data base and reduce the technical risks associated with the extraction and use of ocean derived energy sources to the point that allows industry to judge where and when the technology could be commercialized. DOE's strategy is to perform the necessary R&D required to develop a generic set of experimentally verified predictive models for industry's use. This approach is anticipated to furnish industry with a sufficiently credible data base and incentive to commericalize the ocean technologies, while making additional options available to decision makers in their formulation of a balanced energy supply.

Program emphasis in FY 1987 will be directed toward the "Experimental Verification and Testing" and "Thermodynamic Research and Analysis" segments of the FY 1986 effort. "Material and Structures Research" and "Oceanographic, Environmental and Geotechnical Research" studies have provided a data base available for implementation as integrated efforts within the two areas that are being carried forward and currently do not require the degree of emphasis that was necessary in past years.

EXPERIMENTAL VERTIFICATION AND TESTING

The objective of this program element is to provide a facility for private industry to conduct small-scale seawater tests and experiments which verify OTEC component functional feasibility, performance, and operational characteristics on a scale which can be extrapolated for use in modular systems applicable to small plants.

The FY 1987 budget will provide funds to upgrade the Seacoast Test Facility (SCTF) by expanding the capacity of its seawater systems. This upgrade was specified in the 1985 appropriation bill and is required to allow adequate access to the necessary quantities of warm and cold seawater resources needed to conduct the open-cycle OTEC research experiments. These experiments were also specified by previous appropriation bills, and include validation of components, subsystems and, eventually, a 150 kWe open-cycle test.

The following activity will be supported in FY 1987:

- Seacoast Test Facility Seawater Systems Upgrade
  - The objective of this activity is to provide adequate physical capability at the SCTF to support projected experimental research. This will be accomplished through an on-going 4-year effort to plan, fabricate and install a 30-inch diameter cold water pipe and necessary warm water and discharge pipes to upgrade the SCTF seawater systems. The final design of the installation was completed and long-lead items were procured in FY 1986. Installation of the associated on-shore systems will begin in FY 1987, with completion of the seawater pipe deployment and installation anticipated in FY 1988.

THERMODYNAMIC RESEARCH AND ANALYSIS

The objective of this program element is to experimentally determine the seawater and non-condensible gas effects on the open-cycle heat and mass transfer processes and to validate selected power system analytical models at a scale sufficient to extrapolate to small OTEC plant sizes. This research attempts to establish a generic understanding of how to design potentially cost effective open and latent-heat power systems which could meet the cost goals of the multi-year plan. Reaching these goals is dependent upon increasing the output of the power system and significantly reducing the life cycle cost. Cost reduction for small OTEC plants in the 5 to 15 MWe range is viewed as critical to motivating industrial investment for commericalization of the OTEC technology.

The following activities will be supported in FY 1987:

- Heat and Mass Transfer Analysis and Model Validation
  - This task involves the validation of analytical models for open-cycle OTEC evaporation, condensation and seawater/air sorption processes. During FY 1987, the results from FY 1986 heat and mass transfer experiments will be evaluated. Freshwater laboratory experiments to identify transfer coefficients will be completed and these results will be correlated to seawater engineering data. Process coupling between heat and mass transfer and thermal conversion systems will be modeled and analyzed in this activity. The planning and coordination of the open-cycle program will be accomplished within this activity.
- Advanced Theory for Open-Cycle OTEC Systems Process Integration
  - The objective of this activity is the development of thermodynamic and economic models for open-cycle OTEC systems. In FY 1987, results from fresh water heat and mass transfer experiments conducted in FY 1986 will be incorporated into the open-cycle System Analysis Language Translater (SALT) model to improve the cost algorithms. This task will provide the basis for refining follow-on experiments being performed in FY 1987. The completed product will be an experimentally verified computer model to be used by industry to conduct technology assessments.

	Adjusted FY 1986 Approp.	FY 1987 Request	Net Change
International Solar Energy Program.....	$962,000	$500,000	$462,000

The FY 1987 budget request for Solar International is $500,000, which is a $462,000 reduction from the FY 1986 adjusted appropriation of $962,000.

The Renewable Energy Industry Development Act (P.L. 98-370) passed in 1984 requires that the Federal Government play a catalytic role in promoting U.S. developed renewable energy technology within the competitive international marketplace. The DOE chairs the Committee on Renewable Energy Commerce and Trade (CORECT) and the Renewable Energy program has the lead role for the technical competitiveness subcommittee of this inter-agency working group. Funds will be used to prepare necessary reports and information for use by Federal organizations and industry.

Additionally, budgeted funds are used to conduct a program managed by the trade experts in the Department of Commerce-International Trade Administration (ITA), with broad managerial and technical assistance provided by DOE and the Renewable Energy Export Council, a coordinating body for private sector participants. This Commerce agency cost-shares with U.S. firms the development and presentation of exhibitions, special trade missions, trade seminars and video catalog shows. The FY 1987 funding will provide for a DOE-ITA international trade promotion program with a continuing focus on the international markets of more significant potential.

	Adjusted FY 1986 Approp.	FY 1987 Request	Net Change
Solar Technology Transfer.............	$2,938,000	$1,950,000	$1,033,000

The FY 1987 Solar Technology Transfer budget request of $1,950,000 represents a $983,000 reduction from the FY 1986 adjusted appropriation of $2,938,000.

The objective of the program is to continue mainline technical and public information services in a low-visibility reactive mode of operations. New funds are requested for the purchase of computer capital equipment for word processing in order to facilitate improved production efficiencies.

	Adjusted FY 1986 Approp.	FY 1987 Request	Net Change
Solar Energy Research Institute......	$2,244,000	$545,000	$1,699,000

General Plant Projects - A total of $230,000 is being requested for general purpose capital improvements to the permanent DOE facilities at the Solar Energy Research Institute (SERI). The improvements proposed are the fabrication of a chemical waste neutralization and/or recycling facility, a combustible gas handling system, and general repairs such as repair and maintenance of tertiary roads, plus fire safety improvements.

General Purpose Equipment - A total of $315,000 is being requested for general purpose equipment for the permanent DOE facilities at SERI. Funds are to be used to improve the efficiency and use of the facility. The actions consist of procuring a remote job entry (RJE) station with tape drive, an IBM 3031 upgrade, a high-speed printer, expansion of the toxic gas monitoring system, a HNU photoionizer with three probes, an upgrade of the radio communications system, and an explosion-proof forklift.

	Adjusted FY 1986 Approp.	FY 1987 Request	Net Change
Solar Program Support.................	$1,251,000	$897,000	$354,000

The FY 1987 budget request for Solar Program Support is $897,000, which is a $354,000 reduction from the FY 1986 adjusted appropriation of $1,251,000.

The purpose of this budget item is to provide cross-technology analytical and administrative support to the overall solar/renewable energy research effort.

Technical and administrative assistance is required to minimize requirements for permanent FTE's and to perform short term analyses more suited to contracted analysis. Fixed operating charges for computer and telecommunication equipment usage will also be funded to promote management efficiencies.

	Adjusted FY 1986 Approp.	FY 1987 Request	Net Change
Solar Resource Assessment.............	$962,000	$700,000	$262,000

The FY 1987 budget request for Solar Resource Assessment is $700,000, which is a $262,000 reduction from the FY 1986 adjusted appropriation.

The variability of the solar resource within regions requires greater definition in order to provide the basis for understanding the complex interactions involved in solar technology efficiency and reliability. Activities to improve the overall understanding of resource variability will be continued in order to provide scientific and technical data to researchers and industry participants.

Information regarding the distribution, spectral and temporal variability of solar energy resources is critical for designing appropriate experiments, and for interpolating laboratory and field results. In some instances, the knowledge base appears to be limited and inadequate to postulate and evaluate advanced theories.

For FY 1987, activities will continue for resource measurement and modelling, algorithm development, and the research of new methodologies. Projects will continue to be jointly selected by DOE Solar Energy managers, and representatives from other Federal agencies, universities and industry.

	Adjusted FY 1986 Approp.	FY 1987 Request	Net Change
Solar Program Direction............	$4,518,000	$4,100,000	$418,000

The FY 1987 budget request for Solar Energy Program Direction of $4,100,000 will support a full-time equivalent (FTE) staffing level of 70. This proposal is a $418,000 reduction from the FY 1986 adjusted appropriation and a reduction of 10 FTEs.

SSA

The Federal Solar Energy staff activities consist of three major functions: project/task management, R&D coordination/technology transfer, program and general administrative duties. A wide variety of professional and clerical skills are necessary to administer R&D relating to several innovative technologies, and cross-cutting functional activities.

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- Initiated leaching tests to determine technical feasibility of waste encapsulation while meeting environmental regulations; initiated experiments to determine technical feasibility for decontaminating waste fluids from heavy metals using biochemical methods on geothermal waste.

- Completed isobutane supercritical cycle thermal loop tests; completed vertical-condenser thermal and power-loop testing with isobutane-hexane mixtures as working fluids. This greatly expanded the temperature range over which binary geothermal plants could operate.

- Operated the Geothermal Test Facility in support of heat-cycle research, and performed tests of industry material and equipment.

- Drilled the Salton Sea scientific borehole in a hot hydrothermal reservoir near a magma body and initiated engineering evaluations and resource studies related to the deep scientific hole to test the premise that geothermal resources are larger than presently estimated; studied thermal gradient and other geophysical measures to develop techniques for evaluating geothermal resources masked by deep-flowing rainwater.

- Completed preliminary analysis of magma energy conversion concepts and systems economics, performed seismic survey for probable magma chamber, and tested selected materials for compatibility with magma environment.

- Synchronized, in June, 1985 the main power turbine-generator of the Heber Binary Power Plant (i.e., made compatible with the frequency requirements of the transmission system), following initial turbine tests. After careful shakedown experiments, the complete power plant continued partial power tests in 1986.

- Flow testing at high rates resulted in scale accumulation in a geopressured production well. Chemicals were injected into the producing formation in a test of a new scale control technique. Subsequently, the well was flowed at high rates for extended periods of time without scaling.

- As the result of redrilling one of the two Hot Dry Rock wells, successfully connected the large fracture zone produced from the lower well in 1985 to form a below-ground heat transfer circuit. Initial heat removal experiments were carried out while equipment was designed and constructed for extended heat removal experiments during FY 1986; in addition, the below-ground flow pattern was modified to improve the system hydrodynamics.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
GEOTHERMAL
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Geothermal Energy					
Operating Expenses	$29,298	$26,200	$26,200	$17,930	-$ 8,270
Capital Equipment	$ 400	$ 481	$ 481	$ 0	-$ 481
	$29,698	$26,681	$26,681	$17,930	-$ 8,751
Staffing					
Total FTE	12	15	15	12	(3)

Authorization: P.L. 93-410 Geothermal Energy Research, Development and Demonstration Act of 1974.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES

GEOTHERMAL

(Dollars in Thousands)

FY 1986 Appropriation adjusted	$26,681
Program increases and decreases:	
o Geothermal R&D Operating Expenses	-$ 8,270
o Capital Equipment	-$ 481
FY 1987 Budget Request	$17,930

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
GEOTHERMAL ENERGY NARRATIVE

	FY 1986 Adjusted Approp.	FY 1987 Request	Net Change
Geothermal	$26,681,000	$17,930,000	-$8,751,000

The objective of the Geothermal R&D program is to sponsor research which will facilitate the expanded use by industry of the large, underutilized resource represented by the various forms of geothermal energy. Cooperation with industry is vital to an effective program, and on-going efforts such as cost-shared electricity generation experiments with geopressured resources will be expanded. The program includes research on hydrothermal reservoirs, energy conversion technology, improved hard rock penetration technologies, and advanced technology for the extraction of energy from geopressured, hot dry rock, and magma geothermal resources. Also included is funding for program direction, to manage a broad range of geothermal research and development. The FY 1987 Departmental Request for Geothermal is $17,930,000, which is a $8,751,000 reduction from the FY 1986 adjusted appropriation of $26,681,000.

	FY 1986 Adjusted Approp.	FY 1987 Request	Net Change
Hydrothermal Industrialization	$ 1,525,000	$ 0	-$ 1,525,000

No funds are being requested in FY 1987. The assessment of hydrothermal energy resources on a state basis has progressed to a stage where individual states have the capability to continue these activities as required.

	FY 1986 Adjusted Approp.	FY 1987 Request	Net Change
Geopressured Resources	$ 4,426,000	$ 3,000,000	-$ 1,426,000

The objective of the geopressured resource program is to define the extent and energy content of the geopressured resource and to determine significant technical parameters for extracting and using chemical, thermal, and mechanical energies contained in the geopressured brines. Geopressured brine and natural gas occur worldwide, but are especially well documented beneath the U.S. Gulf of Mexico coast, where the U.S. Geological Survey (U.S.G.S) estimates there are over 60,000 Quads of thermal energy and 50,000 Quads of dissolved methane in place. Prior research under this program has established the magnitude of the resource base, and has shown that the brine can be produced, the methane recovered, and the spent brine injected. But the capacity for extended production at high flow rates has not yet been established. In addition there are the problems related to scaling in wells and the possibility of land subsidence. The proposed research in FY 1987 will address the uncertainties in reservoir longevity and provide technical data that industry can exploit to determine the role of this vast domestic resource in future energy markets.

FY 1987 funds will be used to conduct experimental production testing of wells especially designed and drilled for this research. The wells produce hot brine that contains dissolved natural gas. High pressure in the underground reservoirs causes the brine to flow freely, without pumping, through wells. These multi-year tests, at flow rates in the millions of gallons per day range, will reveal the dynamic characteristics of the underground reservoirs of brine and gas. At the wellhead, natural gas is readily separated from the brine. In cooperation with industry, tests are being conducted on systems that convert the thermal and chemical energy content of the brine to electric power. Scaling control methods, developed in cooperation with industry, also will be tested.

Supporting research will include: chemical analysis of the produced brines and hydrocarbons; analysis of brine pressure, temperature and flow rates to infer underground reservoir rock conditions; scale control research; and investigation of environmental effects, especially land subsidence.

	FY 1986 Adjusted Approp.	FY 1987 Request	Net Change
Geothermal Technology Development......................	$20,029,000	$14,150,000	-$5,879,000

There are four geothermal technology development activities included under the Departmental Request: hydrothermal research, hard rock penetration research, magma energy extraction research, and hot dry rock research.

o Hydrothermal Research

The objective of this activity is to perform research on geothermal reservoirs and energy conversion systems in order to expand the hydrothermal resource base available for development by the private sector. Additional emphasis will be directed toward research on second generation binary systems that will make possible utilization of widespread moderate temperature hydrothermal resources. Royalties from power generated on Federal land already exceed the funding level for DOE hydrothermal research, and these Government revenues are expected to increase greatly as the advancing technology base provides industry with the opportunity to exploit more of the resource. New methodology is being developed to locate and penetrate fractures, the main permeable channels for fluid flow in the reservoir. Instruments and materials will enable industry to evaluate the resource and to produce the energy with the least delay. Large gains in conversion efficiency are obtainable if reliability can be improved. New methods for locating and evaluating the potential resource in selected areas are being tested for applications to this and similar systems.

FY 1987 research will be conducted in the following areas: reservoir definition technology, brine injection technology, materials research, advanced brine chemistry, heat cycle research, Geothermal Test Facility operations, Salton Sea and Continental Scientific Drilling Projects, and Caldera reservoir investigations.

- Reservoir Definition Technology: The objective of this task is to improve the technologies needed to locate, delineate, characterize, and control hydrothermal reservoirs. An improved understanding of geothermal reservoirs will allow private industry to efficiently utilize this energy resource. This task will cover that part of the research which is generic and cannot be accomplished solely by the geothermal industry. Joint research projects with industry participation will be used to advance the technology.

FY 1987 funds will be applied to reservoir studies to determine the location and extent of fractures, the physical and chemical properties of fluid flow, and the most efficient methods of production from the reservoir. Models will be developed and tested with field data to correlate the actual data with model predictions.

- Brine Injection Technology: The objective of this task is development of technology for the economic injection of spent brines into geothermal reservoir formations in order to recharge the reservoir, dispose of the brine, and minimize subsidence. Previous research has shown that injection is necessary to obtain the optimum energy production and longevity from geothermal reservoirs. Several parameters such as location of production and injection wells, flow rates of the wells, and chemistry of injected brine can be adjusted to provide the maximum energy recovery. This task will conduct the research necessary to understand the control of these parameters.

  FY 1987 funds will be used to conduct cost-shared field studies and analysis involving interference pressure tests and tracer test in order to determine the best methodology for location and operation of injection wells; to develop predictive methods for anticipating pressure, chemical, and thermal pulses from injection to production wells; and to develop methods for establishing the rate of chemical precipitation around injection wells.

- Materials Research: The objective of this task is the development of geothermal systems that are capable of resisting highly hostile geothermal environments for prolonged periods of time, thereby increasing equipment life and reliability and reducing the cost of fluid handling. Cost-sharing with industry will continue in this area.

  FY 1987 funds will be used to perform research on metal liners for well casing, polymer concrete composites for heat exchanger tubing, and high temperature cements.

- Advanced Brine Chemistry: The objective of this task is to provide the research necessary to evaluate advanced processing technology for safe disposition of hypersaline geothermal brines. Previous research has shown that geothermal brines contain significant quantities of several metals. These metals represent hazardous waste that must be disposed of, thus increasing the cost of geothermal operations.

  FY 1987 funds will be used to investigate extraction processes that can be used with geothermal brines and solid residues to reduce the hazard of geothermal wastes. In addition, technology will be developed to measure key chemical constituents in process and energy conversion systems.

- Heat Cycle Research: The objective of this task is the development of technology for the economic generation of electricity from moderate temperature hydrothermal resources. These resources are four times as numerous as the high-temperature resources which are currently exploitable with first generation energy conversion technology. If the moderate temperature reservoirs are to be utilized, a new generation of more efficient, reliable, and less costly binary technology must be developed.

  FY 1987 funds will be used to test supersaturated hydrocarbon turbine expansions and to investigate methods of improving direct contact heat exchangers for high salinity brines in order to increase the efficiency of the conversion of geothermal energy.

- Geothermal Test Facility: The objective of the test facility is to provide a field site for testing of geothermal energy conversion systems of interest to industry, in an actual geothermal environment.

  FY 1987 funds will be used to operate the DOE Geothermal Test Facility which will be used for industry and DOE field testing activities. The facility contains geothermal wells and brine handling equipment, test pads, workshops, offices, and a chemistry laboratory.

- Salton Sea Scientific Drilling Project: The objective of this research is to determine the nature of potential reservoirs that underlie a known high-temperature hydrothermal reservoir, in order to better understand the genesis and structure of hydrothermal resources and to assess theories that the nation's hydrothermal resources are far larger than previously estimated. Further, this task will provide the technology and the new and improved materials, tools, equipment, and instrumentation that will be required to conduct drilling, testing, measuring and sampling operations in the hostile environments expected to be encountered in continued scientific drilling into deep thermal regimes. This project is an integral part of the Federal Continental Scientific Drilling Program coordinated between DOE, USGS and NSF. Results of this task when combined with the larger effort of the other agencies, increases the benefit to the geothermal energy program by a very large factor.

  The FY 1987 funds will be used to conduct resource studies, and synthesize results of all the engineering and chemical analysis and instrument testing related to the scientific drilling, testing, and measuring in deep, hot reservoirs containing highly corrosive but potentially valuable brines.

  The funds will also be used to develop, in cooperation with industry, new drilling and casing systems and downhole materials, instruments and sampling techniques.

- Caldera Reservoir Investigations: The objective of this task is to conduct research on techniques for investigating the nature of hydrothermal reservoirs associated with young andesite volcanoes. In such areas the geothermal reservoirs are masked by shallower, cooler aquifers and lower vertical permeability so that thermal gradient measurements and other scientific measurements only begin to characterize the reservoirs at greater depths. Geophysical measurements combined with wells designed for maximum scientific return will be used to perform this research.

  FY 1987 funds will be used to analyze and interpret the drilling, geophysics and geology results gained from prior year testing and measuring of several deep thermal gradient research boreholes. The boreholes were developed to carry out research and tests of new system sensing and evaluation techniques to study young volcanic fields. The project is being cost-shared with industry under cooperative agreements.

o Hard Rock Penetration Research

Geothermal wells represent forty to sixty percent of the cost of geothermal electric power and an even larger fraction of the cost of many direct heat applications. Although geothermal wells are drilled and completed using technology adapted and evolved from oil and gas well drilling, the hot, hard crystalline rock and corrosive environment cause such a rapid degradation of the drilling equipment that geothermal well costs are considerably higher than the costs of similar oil and gas wells by a factor of two to four.

The purpose of research under this activity is to increase the portion of the geothermal resource which is currently exploitable by reducing the technological risks associated with drilling and completing geothermal wells; by investigating new concepts, in cooperation with industry, that show promise for incorporation into second generation geothermal drilling systems; and by performing research in promising technical areas such as advanced alloys, new physical processes, and new design concepts.

In FY 1987, research tasks will be conducted in the following areas:

- Advanced Drilling Research: The objective of this task is to evaluate selected advanced candidate methods for breaking and removal of rock, which have the potential for development into advanced drilling systems.

  FY 1987 funds will be used to perform research, jointly with industry, on several revolutionary drilling concepts. These will include a hybrid drill bit with high pressure jet-assisted cutters; a thruster/retractor for applying weight-on-bit when drilling with downhole motors; downhole measurement, data processing, and control while drilling; and spoolable drill pipe.

- Mechanics of Rock Penetration: The objective of this task is to analyze cavitating jets and drill string dynamics and to measure the parameters associated with rock penetration by methods such as crushing, spalling, shearing, erosion and shock loading under simulated geothermal downwell conditions.

  In FY 1987, the interaction between geothermal formation and drill bit cutters will be studied in laboratory experiments and computer simulations to determine and characterize the critical formation and drilling system properties which control the process of rock penetration. The studies will include rock mechanics as well as the behavior of drill bit cutters, and the influence of various types of drilling fluids.

- Drilling Fluid Loss Control: The objective of this task is to develop new effective materials for controlling the loss of drilling fluids into fractures or aquifers encountered during drilling and completion in high temperature environments. Loss of drilling fluid is one of the most serious problems in geothermal well drilling today since the drilling process must be halted until the situation is corrected; often, the formation can be damaged permanently by excess fluid loss.

  FY 1987 funds will be used to evaluate, in cooperation with industry, new fluid loss materials for preventing and controlling lost circulation in geothermal wells, and to develop computer models to understand the flow near a lost circulation zone to permit the design of remedial methods which correctly address the problem.

o Magma Energy Extraction

The objective of this activity is to understand and evaluate the energy potential contained in the magma resources of the United States. Through this research effort, the knowledge necessary to use this potentially large energy source will be gained. New materials are being developed to withstand the high-temperature (1000°C) corrosive magma environment, and instruments are being designed to monitor drilling and extraction conditions. Incomplete data exists on the depth and size of continental magma chambers. Estimates must be refined based on field and experimental laboratory data, and extrapolations of technology capability must be made and used for an update of the potential of United States magma resources to help supply energy in the future.

The FY 1987 funds will be used to determine the technological potential of magma energy and the advantages of different energy conversion methods and heat extraction processes. Research on materials, equipment, and instrumentation for the high-temperature, hostile environment of magma will continue. In addition, estimates of the depth, size, and temperature of prospective magma chambers will be refined, based on continued data gathering, analysis and interpretation.

- Hot Dry Rock Research

The objective of Hot Dry Rock (HDR) research is to study the fundamental properties of deep hot crystalline rock systems and, based on those findings, determine the technical boundaries and economic feasibility of extracting geothermal heat from hot dry rock resources. The USGS has estimated that in the U.S. as much as 450,000 Quads of potential energy exists in hot dry rock. However, before this vast resource can be expected to be used, it is necessary to develop the science and technology necessary to extract that energy. As part of the Hot Dry Rock project, proof-of-concept experiments were completed in 1980 with a single-fracture thermal loop, and two wells have since been successfully drilled into hot crystalline rock and connected in 1985 through a large reservoir created by a massive hydraulic fracture. Under current plans the loop will be tested to determine system characteristics such as (1) flow control through a multi-fractured system; (2) predicted thermal drawdown and reservoir longevity; (3) reservoir hydrodynamics; (4) changes in system flow impedance; (5) rock-fluid interaction; and (6) environmental effects. It is expected that these tests will be completed by FY 1989. These system characteristics are parameters which must be understood before private sector development can be expected. The preparation and testing of this loop is covered by an International Energy Agency cooperative agreement, and both West Germany and Japan have made important financial and scientific contributions to the project. Their support has been one of the major factors in the experimental progress to date.

FY 1987 funds will be used to complete the assembly and begin the extended testing of a circulation loop and heat exchanger system. This system is a critical part of a reservoir evaluation experiment to determine the characteristics of the large hydraulically-fractured reservoir. Energy capacity studies of the hot crystalline rock containing interconnected flow channels will also be carried out.

Supporting research studies include an evaluation of alternative flow control systems, the use of chemically reactive tracers to map time-temperature flow channels, and the analysis of seismic signals to detect tensile as well as shear fracturing events.

	FY 1986 Adjusted Approp.	FY 1987 Request	Net Change
o Program Direction...............	$ 701,000	$ 780,000	+$ 79,000

The budget request supports 12 FTEs. This includes administrative and technical personnel who manage a broad range of geothermal research and development activities.

Personnel assigned to Headquarters will perform a number of responsibilities including the establishment of broad objectives, determination of work scope, allocation of general resources, and technical management necessary for program direction. Responsibilities will also include the assessment of progress made in meeting DOE technical milestones and cost expenditures, coordination of contractor activities, and initiation of appropriate actions to resolve problems in any of these areas. Further, responsibilities will include administrative and functional activities such as budgeting, procurement, long and short range program planning and personnel management activities. In addition, personnel will be required to interface with a number of other Federal agencies (such as DOD, NASA, NBS, and DOI), national laboratories, industrial concerns, and international bodies in order to execute and coordinate programs of mutual interest.

In addition to activities proposed for funding for FY 1987, research and industrialization projects which were initiated in prior years will be completed during this same period.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
HYDROPOWER
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Tabular dollars in thousands. Narrative material in whole dollars)

Hydropower CE	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Small-Scale Hydropower Development					
Operating Expenses	$ 375	$ 436	$ 436	$ 0	-$ 43
Capital Equipment	$ 0	$ 0	$ 0	$ 0	$
Subtotal	$ 375	$ 436	$ 436	$ 0	-$ 43
Program Direction					
Operating Expenses	$ 72	$ 45	$ 45	$ 0	-$ 4
Subtotal	$ 72	$ 45	$ 45	$ 0	-$ 4
Total					
Operating Expenses	$ 447	$ 481	$ 481	$ 0	-$ 48
Capital Equipment	$ 0	$ 0	$ 0	$ 0	$
Subtotal	$ 447	$ 481	$ 481	$ 0	-$ 48
Staffing					
Total FTE	1	1	1	1	0

Authorization: P.L. 93-577 - Non-Nuclear Energy Research & Development Act of 1974, Section 4
P.L. 95-617 - Public Utilities Regulator Policies Act of 1978
P.L. 96-294 - Energy Security Act of 1980

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Conference	General Reduction	Management Initiatives	Pay Cost Restoration	General Reduction	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
Geothermal (CE)									
Hydrothermal Industrialization Operating Expenses	$ 2,000	$ ---	$ -400	$ -203	$ ---	$ -75	$ 1,322	$ 203	$ 1,525
Geopressured Resources Operating Expenses	4,600	---	---	-5	---	-174	4,421	5	4,426
Geothermal Technology Development Hot Dry Rock Research	5,500	---	---	---	---	-752	4,748	---	4,748
Hydrothermal Research									
Operating Expenses	$ 8,000	$ ---	$ ---	$ -1	$ ---	$ ---	$ 7,999	$ 1	$ 8,000
Capital Equipment	200	---	---	---	---	-8	192	---	192
Subtotal	$ 8,200	$ ---	$ ---	$ -1	$ ---	$ -8	$ 8,191	$ 1	$ 8,192
Hard Rock Penetration Research									
Operating Expenses	$ 2,400	$ ---	$ ---	$ ---	$ ---	$ ---	$ 2,400	$ ---	$ 2,400
Capital Equipment	200	---	---	---	---	-8	192	---	192
Subtotal	$ 2,600	$ ---	$ ---	$ ---	$ ---	$ -8	$ 2,592	$ ---	$ 2,592
Magma Energy Extraction Research									
Operating Expenses	$ 4,400	$ ---	$ ---	$ ---	$ ---	$ ---	$ 4,400	$ ---	$ 4,400
Capital Equipment	100	---	---	---	---	-3	97	---	97
Subtotal	$ 4,500	$ ---	$ ---	$ ---	$ ---	$ -3	$ 4,497	$ ---	$ 4,497
Total, Geothermal Technology Development	$27,400	$ ---	$ -400	$ -209	$ ---	$-1,020	$25,771	$ 209	$25,980
Program Direction	800	-56	---	-70	-14	-29	631	70	701
Subtotal, Geothermal	$28,200	$ -56	$ -400	$ -279	$ -14	$-1,049	$26,402	$ 279	$26,681
General Reduction: Operating Expenses	-56	56	---	---	---	---	---	---	---
Management Initiatives: Operating Expenses	-400	---	400	---	---	---	---	---	---
F.E Reduction	-14	---	---	---	14	---	---	---	---
Pay Restoration	-279	---	---	279	---	---	---	---	---
Use of Prior Year Balances (Geothermal) Operating Expenses	279	---	---	---	---	---	279	-279	
Total, Geothermal	$27,730	$ ---	$ ---	$ ---	$ ---	$-1,049	$26,681	$ ---	$26,681
Operating Expenses	$27,230	$ ---	$ ---	$ ---	$ ---	$-1,030	$26,200	$ ---	$26,200
Capital Equipment	500	---	---	---	---	-19	481	---	481

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
HYDROPOWER
SUMMARY OF CHANGES

(Dollars in Thousands)

FY 1986 Appropriation adjusted	$ 481
Program Increases and Decreases:	
o Technology Support	-$ 436
o Reduce Program Direction	-$ 45
FY 1987 Budget Request	$ 0

DEPARTMENT OF ENERGY

FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

HYDROPOWER

Since 1977 the Department has invested more than $70 million in the Small-Scale Hydropower Program. The program's activities have succeeded in providing a technology base to industry for use in its decision-making process, and it has been determined that development can now be turned over to the private sector. Therefore, no funds are requested for FY 1987.

By the end of 1986, eighteen Technology Development projects will be on-line, with one more (Flat Rock) under construction. By the end of FY 1986, at least one of the three engineering R&D projects will be operational. These will be monitored as necessary on an *ad hoc* basis, and the design, construction and operation and maintenance data transferred to industry.

	FY 1986 Adjusted Approp.	FY 1987 Request	Net Change
Hydropower..............................	$ 481,000	$ 0	-$ 481,000

The FY 1987 Departmental Request for hydropower is 0. This represents a decrease of $481,000 from the FY 1986 adjusted appropriation. Remaining projects will be monitored by DOE as necessary on an *ad hoc* basis.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
Electric Energy Systems and Energy Storage

The mission of the Electric Energy Systems and Energy Storage program supports directed research to provide options for future electric network, electrochemical and energy storage systems, and stimulate new concepts and systems to enhance the reliability, efficiency, and safety of the Nation's energy systems under normal and abnormal conditions. The program will attempt to utilize partnerships with industry through cooperative R&D ventures on applied technology development of generic or precompetitive nature.

The Electric Energy Systems (EES) research is in three areas: (1) Electric Field Effects, on biological effects and risks to life forms exposed to high voltage electric and magnetic fields; (2) Reliability, to provide an understanding of the future electric networks to retain the reliability, and National security of the Nation's more complex electrical systems; (3) Systems Technology, to provide the technology base for improved electric power systems by exploring new concepts and developing new materials.

The Energy Storage (STOR) research is in two areas: (1) Electrochemical, to provide the technology base for more efficient, less expensive, safer, and more reliable batteries for electric vehicles, electric utility load leveling, and other stationary energy storage applications; (2) Thermal and Mechanical, to provide the technology base for chemical/ hydrogen production and advanced thermal storage systems through new materials, catalysts, and processes.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
ELECTRIC ENERGY SYSTEMS AND ENERGY STORAGE
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	Adjusted FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Reque t vs Ba e
Electric Energy Systems					
Operating Expenses	$19,493	$11,548	$11,548	$7,619	$-3,9 9
Capital Equipment	224	0	0	0	0
Total	$19,717	$11,548	$11,548	$7,619	$-3,9 9
Staffing					
Total FTE	7	6	6	5	-1
Energy Storage					
Operating Expenses	18,152	17,100	17,100	8,600	-8,5 0
Capital Equipment	490	192	192	0	-1 2
Total	$18,642	$17,292	$17,292	$8,600	$-8,6 2
Staffing					
Total FTE	6	6	6	6	0

Authorization: P.L. 93-409, Solar Heating and Cooling Demonstration Act of 1974.
P.L. 93-577, Federal Nonnuclear Energy Research and Development Act f 1974.
P.L. 94-413, Electric and Hybrid Vehicle Research, Development, a d Demonstration Act of 1976.
P.L. 95-91, Department of Energy Organization Act.
P.L. 95-590, Solar Photovoltaic Energy Research, Development, a d Demonstration Act of 1978.
P.L. 95-619, National Energy Conservation Policy Act of 1978.

SUMMARY OF CHANGES
(in thousands of dollars)

ELECTRIC ENERGY SYSTEMS

FY 1986 Adjusted Appropriation	$11,000

Program Increases and Decreases:

- The Electric Energy Systems research program will be reduced, with some projects closed out and others stretched out.

FY 1987 Request	$ 7,619

ENERGY STORAGE

FY 1986 Adjusted Appropriation	$17,292

Program Increases and Decreases:

- The Energy Storage research program will be reduced, with some projects closed out and others stretched out.

FY 1987 Budget Request	$ 8,600

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Conference	Pay Cost Restoration	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
Hydropower						
Small-Scale Hydropower Development Operating Expenses	$ 453	$ -3	$ -17	$ 433	$ 3	$ 436
Program Direction Operating Expenses	47	---	-2	45	---	45
Subtotal, Hydropower	$ 500	$ -3	$ -19	$ 478	$ 3	$ 481
Pay Restoration	-3	3	---	---	---	---
Use of Prior Year Balances (Hydropower) Operating Expenses	3	---	---	3	-3	---
Total, Hydropower	$ 500	$ ---	$ -19	$ 481	$ ---	$ 481
Operating Expenses	$ 500	$ ---	$ -19	$ ---	$ ---	$ 481

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Conference	Pay Cost Restoration	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
Electric Energy Systems						
Electric Field Effects Operating Expenses	$ 3,000	$ ---	$ -113	$ 2,887	$ ---	$ 2,887
Reliability Research & Development. Operating Expenses	3,000	-1	-113	2,886	1	2,887
Systems Technology Operating Expenses	5,630	-39	-212	5,379	39	5,418
Program Direction	370	---	-14	356	---	356
Subtotal, Electric Energy Systems	$12,000	$ -40	$ -452	$11,508	$ 40	$11,548
Pay Restoration	-40	40	---	---	---	---
Use of Prior Year Balances (EES) Operating Expenses	40	---	---	40	-40	---
Total, Electric Energy Systems	$12,000	$ ---	$ -452	$11,548	$ ---	$11,548
Operating Expenses	$12,000	$ ---	$ -452	$11,548	$ ---	$11,548

Department of Energy

FY 1987 Congressinal Budget Request

Adjustments to FY 1986 Appropriations

Energy Storage Systems	FY 1986 Conference	Management Initiatives	Pay Cost Restoration	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
Battery Storage							
Operating Expenses	$14,500	$ -130	$ -38	$ -542	$13,790	$ 38	$ 13,828
Capital Equipment	200	---	---	-8	192	---	192
Subtotal	$14,700	$ -130	$ -38	$ -550	$13,982	$ 38	$14,020
Thermal and Mechanical Storage							
Operating Expenses	$ 3,060	$ ---	$ ---	$ -115	$ 2,945	$ ---	$ 2,945
Program Direction	340	---	-2	-13	325	2	327
Subtotal, Energy Storage Systems	$18,100	$ -130	$ -40	$ -678	$17,252	$ +40	$17,292
Management Initiatives:							
Operating Expenses	-130	130	---	---	---	---	---
Pay Restoration	-40	---	40	---	---	---	---
Use of Prior Year Balances (ESS)							
Operating Expenses	40	---	---		40	-40	---
Total, Energy Storage Systems.	$17,970	$ ---	$ ---	$ -678	$17,292	$ ---	$17,292
Operating Expenses	$17,770	$ ---	$ ---	$ -670	$17,000	$ ---	$17,100
Capital Equipment	200	---	---	-8	192	---	192

The mission of the Electric Energy Systems and Energy Storage program is to support directed research which will provide options for future electric network, electrochemical and energy storage systems, and stimulate development of concepts and systems which will enhance the reliability, efficiency and safety of the Nation's energy systems under both normal and abnormal operating conditions.

The Electric Energy Systems (EES) program supports research directed toward solving mid- to long-term problems in electric transmission and distribution, and integrating new concepts and renewable energy resources into the utility network. The research is divided into three subprograms:

- o Electric Field Effects - The objective is to support research on the biological effects and risks to life forms exposed to high voltage electric and magnetic fields.

- o Reliability R&D - The objective is to provide an understanding of the future electric networks through research to retain the reliability of the Nation's increasingly larger and more complex electrical transmission and distribution systems for national security and economic health.

- o Systems Technology - The objective is to provide the technology base through research on new concepts and materials such as next generation semiconductors which will provide improved components in the future for applications in electric power systems and contribute to overall development of the technology base.

The results of the sponsored R&D will help form the basis for a continuous future supply of energy in the most cost-effective and safe manner possible while meeting National security and human safety goals. The commitment to research required to develop and maintain safe and reliable advanced energy storage and distribution systems is longer and more sustained than any group of utilities, or research arm of industry has thus far made.

The Energy Storage (STOR) Program supports research of advanced energy storage and electrochemical systems that will facilitate the substitution of oil and gas fuels by coal, nuclear and renewable energy sources, and will increase the reliability and efficiency of the energy economy. The research is divided into two subprograms:

- o Electrochemical - The objective is to provide the technology base for more efficient, less expensive, safer and more reliable rechargeable batteries and other electrochemical systems for use in electric vehicles, electric utility load leveling and other stationary energy storage applications.

- o Thermal and Mechanical - The objective is to provide the technology base for chemical/hydrogen production and advanced thermal storage systems for use in residential, commercial, industrial and utility applications. The focus of activities in this area is to investigate new materials, catalysts, and processes to meet performance requirements for thermal storage and hydrogen as a cost-effective energy carrier and potential storage medium.

Recent accomplishments of the Electric Energy Systems research program include:

- o Completed Purdue University Power Systems Simulator. This simulator is being used by the government and private sector as a research tool to develop dynamic analysis of systems/generators during system disturbances.
- o Completed test protocols for 2 Megawatt (MW) zinc/chlorine battery at the BEST facility.

- o Completed life testing of the 1200 kV compressed gas insulated transmission underground cable and substation equipment at EPRI's Waltz Mill Facility. With the successful completion of the life test, the 1200kV compressed gas insulated cable and substation equipment technology will be transferred to the utility industry.

- Completed development of High-Voltage Direct Current (HVDC) compressed gas insulated cable technology and transferred technology to cable industry.
- Completed research identifying safety and protection requirements for small power producers connected to distribution system. This will allow the integration of diversified power sources without compromising the integrity of the electric network.
- Completed project to develop advanced concepts for superconducting synchronous generator.
- Completed investigation of harmonic frequency propagation from dispersed generating devices in distribution networks and on the impact of harmonics on selected protective devices not only on the electric network but also on the owner's equipment.
- Completed assessment of fiber optics technology applications for power systems sensing and communication. This technology shows promise for greatly enhanced real-time systems operations and control.
- Completed circadian (daily) rhythm studies in small animals exposed to high voltage electric fields. These and other biological studies provided data that is highly relevant to the evaluation of health risks to humans when exposed to high-strength electric fields.
- Completed basic theoretical work on threshold voltage and maximum operating stresses for selected high-voltage insulation systems. The results of this are being transferred to the private sector and will lead to future high voltage insulating systems with greatly improved lifetimes.
- Determined the mechanisms for operation of advanced zinc-oxide insulators from an analysis of its fundamental properties. The results were used to produce components for protection of equipment from transient voltage spikes include lightning.
- Developed novel load-flow mathematical and computerized methods and fast-state estimation techniques for identifying power systems instabilities allowing for the first time at or near real-time analysis of changing system conditions.
- Completed development of singular perturbation theory for analyzing network transients, to give indication of impending network instability.

The EES program as constituted in FY 1986 has research programs in:

- electric field effects to determine the impact of exposure to high-voltage a.c. and d.c. electric and magnetic fields on living tissue and whole bodies.
- electromagnetic pulse (EMP) derived from high altitude and ground-level nuclear bursts and the potential impact on the Nation's civilian electric network.
- reliability to maintain and improve the Nation's electric power systems while reducing the per-unit capital cost. System stability and restoration after failure are central to this work.
- materials research focused on interfacial phenomena in liquid and solid dielectrics and semiconductors.
- superconducting power technologies with transfer of some of the results to ambient systems.

- performance verification of advanced batteries for utility load leveling.

Recent accomplishments of the Energy Storage research program include:

- Obtained encouraging results on a thermally regenerative electrochemical system employing sodium as a working fluid to produce electricity from heat with no moving parts. The work has now been transferred and is funded by DOE Industrial and Solar Thermal Programs for further development.

- Confirmed high catalytic properties of heat treated metal-organic based components which will replace expensive, scarce precious metals in various applications, including air batteries and fuel cells. Using these catalytic components, 1,950 simulated driving cycles have been successfully completed for vehicle batteries.

- Increased the life of carbon in electrochemical cells by reducing the carbon porosity, which had been identified as a major problem.

- Developed a zirconia-toughened beta double prime (beta") -alumina for use as an electrolyte in the sodium/sulfur cells. The new electrolyte has greater strength than that of pure beta"-alumina, and improved resistance to cracking.

- Completed a computer simulation and model of cell-crystallizer interaction that is a critical step in determining an optimal design for an aluminum/air battery.

- Identified a new sodium/sulfur system has been identified with energy density in excess of 350 Wh/kg compared to the present system of 120 Wh/kg. The Department of Defense is adapting this sodium/sulfur battery technology for use in satellite batteries.

- Completed laboratory evaluation of performance characteristics of mixed refrigerants in clathrate thermal storage during charging and discharging cycles. These studies are part of the effort to develop an efficient heat pump/cool storage system capable of shifting consumption from on-peak to off-peak hours for air conditioning applications.

- Completed evaluation of encapsulation processes for a low-cost form-stable silicon-aluminum eutectic storage medium for use in high-temperature rapid-cycling applications.

- Completed the first long-cycle test of the deep aquifer heat storage facility at the University of Minnesota with the successful elimination of salt precipitation problems. Transferred data to private sector.

- Completed two annual long-term chill storage cycles for air conditioning at the University of Alabama and initiated data analysis.

- Verified in the laboratory an intermittent galvano-electric cooling effect for a biased thin film semiconductor. This accomplishment represents a potential first step in the development of a solid-state heat pump storage device.

- Completed integration of an advanced solid polymer electrolyte water electrolyzer module at the Brookhaven National Laboratory integrated test bed for use on photovoltaic systems.

- Successfully demonstrated methods for applying polymer coatings to semiconductors to decrease photo-corrosion on the photochemical production of hydrogen.

- Identified carbon monoxide as a minor gas additive to hydrogen to prevent embrittlement at high pressures in ordinary pipeline steels.

The STOR program as constituted in FY 1986 has research in:

- optimizing the strength/resistivity ratio of Beta"-alumina by using transformation toughening. This work is critical in the development of long life for the electrolyte in the sodium-sulfur battery.
- investigating the properties of conductive polyethylene oxide. The development of a new type of high-energy-density battery could follow this work.
- Investigating the cause of dendritic deposition in flow batteries that use aqueous zinc-halide solutions. This work is in support of the development of the zinc-bromine battery.
- performing research to advance the development of molten salt batteries. Such batteries could have a very long cycle life.
- exploring molten-salt electrodeposition and chemical vapor deposition for preparation as corrosion-resistant coating on low-carbon steel. This could lead to the development of containers for batteries that have highly corrosive chemicals.
- investigating new concepts for metal electrodes and air electrodes in metal-air cells and conducting a comparative analysis for their application in electric vehicle. Also included is supporting research in the development of the aluminum-air battery.
- evaluating and developing new materials for use in high-performance secondary storage batteries.
- investigating high-temperature water electrolysis to produce hydrogen. When developed, the electrical requirements for this method of energy storage are projected to be about one-half those of conventional electrolysis methods.
- performing R&D on thermal storage with cost-effective and efficient energy transfer techniques including direct-contact methods. The cost of energy transfer or heat exchange in and out of storage is a major problem in commercializing thermal storage technologies.
- investigating selected advanced storage concepts including solid-state cooling/storage devices.

	Adjusted FY 1986 Appropriation	FY 1987 Request	Net Change
Electric Energy Systems	$11,548,000	$7,619,000	$3,929,000

The program content provides for research to build a technology base which will lead to advanced concepts and materials for future electric networks to meet the National security need for a reliable electric supply and the health and safety of society. This program has been evolving away from equipment orientation to more basic and applied research needed to make major improvements in future electric systems. The work supports research at National Laboratories, universities, and corporate laboratories.

Specifically, the EES program encourages and supports research directed to resolving mid- to long-term problems which will ensure that the biological health effects and risks to life forms exposed to high voltage electric and magnetic fields are well understood and mitigated; provide options that will ensure appropriate system reliability and the efficient use of capital resources during the expansion of the Nation's future electric network; provide electric power over a wide range of system conditions including both normal and emergency situations, as well as improvements needed for National security; and improve the efficiency of electric systems through the development of new materials, advanced controls and new design concepts. The EES program continues to support research in three specific activities: Electric Field Effects, Reliability R&D, and Systems Technology.

Electric Field Effects research will provide a technology base for a greater understanding into the potential health effects and risks to humans, plants, and animals when exposed to high-voltage transmission systems. The ultimate objective is to provide data to determine whether the more efficient and reliable high-voltage systems can be employed with minimum impact to the public and the environment. Identifying the biological effects and determining the interaction of biological mechanisms producing those effects and developing a methodology to analyze human risk are research activities that must be performed if realistic and logical decision are to be made by the public or regulating bodies.

The budget request will provide for the continuation of the highest priority biological a.c. and d.c. research programs to establish an objective scientific data base of electric and magnetic field effects, relating animal data to potential human hazards. The a.c. program will include analyses of the effects of a.c. magnetic fields and the continuation of the initiative between the Central Research Institute of the Electric Power Industry (CRIEPI) of Japan and the DOE to study the possible behavioral effects of high-voltage electric fields upon non-human primates. The objective of this multi-project international agreement is to perform research on the effect of field intensity on animals. Also under this agreement and under separate contracts, research will be supported on the effects of chronic exposure to 60 Hz electric fields. The results of these projects will ultimately be used to assist predicting the presence or absence of hazards to humans. In addition the a.c. program will continue developing risk analysis methodologies of exposure to a.c.-induced electric and magnetic fields. The d.c. program research will continue to investigate mechanisms interacting within the respiratory system due to exposure to high-voltage d.c. systems as well as research to develop the d.c. risk analysis methodology.

The budget request permits the Reliability R&D program to continue at a reduced rate. The research focuses on concepts and methods needed to plan and operate future more complex electric energy systems, during all normal and emergency conditions. The increase in complexity is being driven by National security and economics, including the need for more extensive interconnections between operating areas, the continual tightening of constraints (e.g., operating closer to capacity limits, expensive financing), and the development of and integration into the system of advanced system control and protection technologies which in themselves are very complex.

The FY 1987 funding will specifically permit a second level electromagnetic pulse (EMP) assessment of potential system change to continue on a stretched out schedule through a continuation of the principal on-going contract. Research on options to improve the reliability of the network or suppress the transient will however be postponed. The normal/emergency operating concepts project will continue; specifically, research for the on-line detection and recognition of system inabilities. Research on posturing strategies as well as adaptive relays for the protection of large networks will be delayed. There is no request for research into failure mechanisms.

The Systems Technology research area, designed to provide the knowledge and technology base to encourage substantial improvements in economics and extended component capability in future electric systems will be significantly changing in FY 1987. The long-term goal is to develop the capability and a technology base to integrate system functions that will ultimately permit optimization of all types of energy sources. The research program design was on developing new materials which will provide more efficient and reliable options for future components, and on developing a U.S. technology base to meet severe foreign competition.

In FY 1987 a limited materials technology base will be continued concentrating this year on interfacial phenomena in liquid dielectrics and promising semiconductor materials. The results of this project will ultimately aid the Nation's industries to develop and market equipment with superior life cycle costs. It could also lead to the development of new equipment presently not feasible because of material property constraints. The development of advanced automation and data processing concepts (i.e., Athens Automation and Control Experiments, communications/data processing trade-off studies and investigations of the applicability of fiber optics) will be closed-out as will the research activities of the superconductivity and ambient cable technologies. Documentation and final reports will be completed with accumulated data and information prepared and made available for historic reference.

	Adjusted FY 1986 Appropriation	FY 1987 Request	Net Change
Program Direction................................	$356,000	$350,000	$6,000

The funding will provide for 5 FTE personnel which is required to effectively plan and manage the Electric Energy Systems research program.

	Adjusted FY 1986 Appropriation	FY 1987 Request	Net Change
Energy Storage	$17,292,000	$8,600,000	$-8,692,000

The primary aim of the Energy Storage research program is to provide a technology base that will assist the final development and commercialization of advanced storage technologies. The request which substantially alters the portfolio toward a more basic and fundamental research agenda will provide for the continuation of research of advanced energy storage and other electrochemical systems. Ultimately, this research will provide the capability to utilize renewable energy resources and keep abreast of international technology development of advanced energy storage systems. This research also will contribute to the National security needs for a reliable energy supply.

The energy storage program ranges from more fundamental research, traditionally performed at universities, to exploratory development of technical concepts. The program is a coordinated cooperative effort conducted at National laboratories, universities, and private laboratories. A vital part of the electrochemical energy storage program is the technology base research which includes efforts to evaluate new systems, materials, and components. There will be a phase down for technology core research specifically on currently active development efforts.

The Electrochemical Program is divided into two subprograms:

Technology Base Research - Research is conducted on electrochemical systems that are projected to exceed the goals of systems in the development stage. These activities support fundamental research into the underlying principles applicable to batteries and electrochemical systems and existing electrochemical energy storage and conversion systems and provide the mechanisms for the evolution and development of new systems. During FY 1987 activities in this area will concentrate on:

- Electrochemical phenomena - Providing a better understanding of the complex phenomena that limit the performance and lifetime of electro-chemical systems. The work will continue to perform research on: the morphology of electrodes under continued cycling, kinetics of diffusion in electrolytes, and concurrent parasitic reactions occurring during cell operation.
- Materials and components - Developing improved materials and new components for electrodes, electrolytes, polymeric separators, and current collectors required to advance or improve energy storage technology.
- Electrocatalysis - Investigating new catalysts for electrochemical energy conversion systems, in both alkaline and acid media, and acquire atomic level understanding of complex electrochemical reactions of electrode surfaces.
- Advanced battery research - Continue studying advanced lithium batteries with high specific energy, and the capability to operate at ambient temperatures with emphasis being on rechargeable lithium electrodes.
- Electrochemical conversion - Continue investigating small fuel cells which offer an efficient means for utilizing hydrogen (produced on the vehicle from methanol or ammonia) and could be employed as a power source for "unlimited-range" electric vehicles. Current technical limitations include system size and cost, as well as response time to power demand transients.

Exploratory Technology Development - Exploratory technology development and testing provides for the initial development of those electrochemical systems which have been shown to be scientifically feasible by technology base research activities. The goal is to perform core technology research necessary to provide for orderly evaluation of batteries for use in electric and hybrid vehicles, utility load leveling and dispersed energy storage applications. Analysis of evaluation data provides insight into other materials and components R&D required to enhance overall performance. The Exploratory Technology Development activity in FY 1987 will focus entirely on completing sodium/sulfur core technology research.

- Sodium/sulfur Technology (Alkali Battery Research) - Research on high energy content sodium/sulfur batteries for electric vehicles and load leveling applications will continue as part of the third and final year of the core technology development project. Emphasis will be on elimination of freeze-thaw failure, improved thermal management in batteries, and lower cost corrosion-resistant containers. The major goal is to increase the reliability and life of the system while also reducing the costs.

The Thermal and Mechanical Storage program is divided into two subprograms listed below. The purpose of this research program is to provide the technology base for the more effective use of thermal energy resources and improving the efficiencies of chemical/hydrogen systems. These technologies will permit energy conversion or fuel substitution in transportation, residential and commercial buildings, industry, and electric utility areas.

Chemical/Hydrogen Production and Storage. The aim of this effort is to develop hydrogen base technologies for establishing a link between solar and other inexhaustible resources and the load centers of the future. The long-range baseline program addresses two major research activities: 1) primary resource conversions to hydrogen as an energy carrying fuel and chemical commodity, and 2) bulk and mobile storage options for hydrogen. Current emphasis is placed on the development and characterization of high-temperature water vapor electrolysis cells operating as a process with a high probability of successfully meeting objectives of efficient water dissociation with analyses projecting thermal efficiencies approaching 50%. Alternatives to high-temperature electrolysis include intermediate temperature (300°-600°C) electrolysis and photochemical processes. Hydrogen storage efforts, currently at early research stages will continue to identify advanced metal hydrides and cold storage on catalyzed carbon. Research will also be performed on advanced hydrogen liquefaction processes based on thermally-driven metal hydride systems.

Thermal Energy Storage Research. The diurnal thermal program will continue to include research to develop the technology base for thermal storage systems. Activities focus on diurnal storage systems which store heat and cold using inclusion compounds, such as freon hydrate or phase-change materials in packed beds and slurry systems. Dual-temperature systems with transition temperatures using form-stable phase-change materials with direct-contact heat exchange will continue. Innovative concepts such as solid state heat pumps and containment techniques for high-temperature as well as solar thermal storage will be explored.

	Adjusted FY 1986 Appropriation	FY 1987 Request	Net Change
Program Direction..................................	$327,000	$399,000	$72,000

Funding will support six full-time-equivalent positions needed to provide management of the Energy Storage Program.

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

NUCLEAR

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DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

NUCLEAR OVERVIEW

Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Approp.	FY 1986 Approp. 1/	FY 1987 Base	FY 1987 Request	Request vs Base
Nuclear Energy Research and Development (NE)					
Operating Expenses......	$385,087	$357,019	$357,019	$307,520	$-49,499
Capital Equipment.......	19,725	13,181	13,181	14,580	1,399
Construction............	7,800	5,484	5,484	8,800	3,316
Subtotal..............	$412,612	$375,684	$375,684	$330,900	$-44,784
Remedial Action and Waste Technology					
Operating Expenses......	$168,845	$228,220	$228,220	$291,200	$ 62,980
Capital Equipment.......	1,520	1,827	1,827	2,900	1,073
Subtotal..............	$170,365	$230,047	$230,047	$294,100	$ 64,053
Civilian Radioactive Waste R&D					
Operating Expenses......	$ 23,386	$ 13,091	$ 13,091	$ 6,500	$ -6,591
Capital Equipment.......	2,500	2,973	2,973	--	-2,973
Subtotal..............	$ 25,886	$ 16,064	$ 16,064	$ 6,500	$ -9,564
TOTAL					
Operating Expenses......	$577,318	$598,330	$598,330	$605,220	$ 6,890
Capital Equipment.......	23,745	17,981	17,981	17,480	-501
Construction............	7,800	5,484	5,484	8,800	3,316
Grandtotal............	$608,863	$621,795 1/	$621,795	$631,500	$ 9,705
Staffing Total FTE's......	187	161	161	154	-7

Appropriation: Sec: 31, P.L. 83-703, Sec. 309(a), P.L. 95-91, and P.L. 96-567

1/ Adjustments to the FY 1986 Appropriations are described in the table on the following pages.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
ADJUSTMENTS TO FY 1986 APPROPRIATION
(Dollars in Thousands)

Program	FY 1986 Confer	Gen Reduct	Mgmt Init	Paycost Restore	FTE General Reduct	Gramm Rudman Hollings	ES&H Trans/ Reprog	Sub Total	Comp Admjts	Total
NUCLEAR										
Improved LWR Technology										
Improved LWR Development-OE	13,000					-491		12,509	-12,509	0
Three Mile Island R&D-OE	32,300					-1,221		31,079	-31,079	0
Sub Total-Impr LWR Tech	45,300	0	0	0	0	-1,712	0	43,588	-43,588	0
Advanced Converter Reactor										
Advanced LWR-OE	4,750	0	0	0	0	-180	0	4,570	-4,570	0
Advanced HTGR-OE	31,000		-250			-1,162		29,588	-29,588	0
-CE	1,000					38		962	-962	0
Subtotal-Adv HTGR	32,000	0	-250	0	0	-1,200	0	30,550	-30,550	0
Liquid Metal Converter-OE	70,000		-3,750			-2,504		63,746	-63,746	0
-CE	200					-8		192	-192	0
-PLT	1,000					-38		962	-962	0
Subtotal-Liquid Metal Conv	71,200	0	-3,750	0	0	-2,550	0	64,900	-64,900	0
Subtotal-Advanced Conv Rea	107,950	0	-4,000	0	0	-3,930	0	100,020	-100,020	0
Advanced Breeder Reactors										
Breeder Components Tech-OE	6,700					- 253		6,447	-6,447	0
Fuel Performance & Supply-OE	22,900		-800			-835		21,265	-21,265	0
-CE	2,000					-76		1,924	-1,924	0
Subtotal-Fuel Perf	24,900	0	-800	0	0	-911	0	23,189	-23,189	0
Reactor Core Tech-OE	4,900					-185		4,715	-4,715	0
-CE	2,320					-88		2,232	-2,232	0
Subtotal-Reactor Core Tech	7,220	0	0	0	0	-273	0	6,947	-6,947	0
Test Facilities-OE	98,200	-728			-183	3,683	-50	93,556	-93,556	0
-CE	4,480					-169		4,311	-4,311	0
-Plt	1,800					-68		1,732	-1,732	0
Subtotal-Test Facilities	104,480	-728	0	0	-183	-3,920	-50	99,599	-99,599	0
Clinch River Breeder Reactor	0	- 19,301	0	-9,699	0	0	0	-29,000	29,000	0
Nuclear Fuel Cycle-OE	16,500	0	0	0	0	-624	0	15,876	-15,876	0
Subtotal-Advanced Breeder	159,800	-20,029	-800	-9,699	-183	-5,981	-50	123,058	-123,058	0
Water Cooled Breeder										
Defueling-OE	5,100					-193		4,907	-4,907	0
Core Evaluation-OE	14,600					-552		14,048	-14,048	0
Subtotal-Water Cooled Brd	19,700	0	0	0	0	-745	0	18,955	-18,955	0

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
ADJUSTMENTS TO FY 1986 APPROPRIATION
(Dollars in Thousands)

Program	FY 1986 Confer	Gen Reduct	Mgmt Init	Paycost Restore	FTE General Reduct	Gramm Rudman Hollings	ES&H Trans/ Reprog	Sub Total	Comp Adjmts	Total
Civilian Reactor Development										
Reactor Devel Generic Suppt	2,625					-99		2,526	-2,526	0
Safeguards & Security-OE	5,750					-217	-650	4,883	-4,883	0
-Plt	900					-34		866	-866	0
Subtotal-Safeguards & Sec	6,650	0	0	0	0	-251	-650	5,749	-5,749	0
Reduced Enrich for Test Reac	5,200					-197		5,003	-5,003	0
Program Direction-OE	7,400					-280		7,120	-7,120	0
Subtotal-Civ Reactor Devel	21,875	0	0	0	0	-827	-650	20,398	-20,398	0
Advanced Nuclear Systems										
Space & Spec Appl-OE	20,455					-773		19,682	-19,682	0
-CE	1,700					-64		1,636	-1,636	0
Subtotal-Space & Spec Appl	22,155	0	0	0	0	-837	0	21,318	-21,318	0
Program Direction-OE	845	0	0	0	0	-32	0	813	-813	0
Subtotal-Adv Nuclear Sys	23,000	0	0	0	0	-869	0	22,131	-22,131	0
Defense Nuclear Energy Program										
Space Reactor Project-OE	12,610					-477		12,133	-12,133	0
-Plt	2,000					-76		1,924	-1,924	0
Subtotal-Space Reactor	14,610	0	0	0	0	-553	0	14,057	-14,057	0
Terrestrial Applications	2,500	0	0	0	0	-94	0	2,406	-2,406	0
Program Direction-OE	390	0	0	0	0	-15	0	375	-375	0
Capital Equipment	2,000	0	0	0	0	-76	0	1,924	-1,924	0
Subtotal-Def Nucl Energy	19,500	0	0	0	0	-738	0	18,762	-18,762	0
Nuclear Waste Technology										
Low Level Waste-OE	4,650					-176		4,474	-4,474	0
-CE	100					-4		96	-96	0
Subtotal-Low Level Waste	4,750	0	0	0	0	-180	0	4,570	-4,570	0
Waste Treatment Tech-OE	6,000					-227		5,773	5,773	0
-CE	450					-17		433	-433	0
Subtotal-Waste Treat Tech	6,450	0	0	0	0	-244	0	6,206	-6,206	0

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
PROGRAM OVERVIEW

Nuclear

The Department of Energy's (DOE's) nuclear energy supply research and development effort consists of two major programs: Nuclear Energy Research and Development and Remedial Action and Waste Technology.

Nuclear energy program activities are essential elements in achieving a national goal of providing an adequate, strong, secure and stable supply of energy at reasonable cost. Nuclear energy constitutes one of the key elements in the Nation's energy triad, along with fossil and renewable energy resources, and should continue to provide a major contribution to our national energy needs. Continuing nuclear energy research and development will (1) help assure nuclear energy contributes to our civilian needs for a balanced and secure domestic energy base as well as our emerging military needs to meet national security objectives, and (2) provide the technical and industrial base for continued deployment of advanced nuclear technologies in the future.

Nuclear energy research and development program emphasis and priorities are being shifted significantly consistent with increasing space and defense nuclear energy needs, currently anticipated timing for commercial deployment of advanced reactors beyond light water reactors, and limited R&D resources. The primary emphasis in advanced reactor R&D is to support national security requirements, including the Strategic Defense Initiative. Certain benefits that accrue from this R&D work will be applied to future civilian reactor development efforts and some complementary civilian reactor base technology programs will continue. Since application of improved "state of the art" light water reactors (LWR) represent the most likely path to revitalizing the nuclear power option, emphasis is on supporting a process leading to enhanced safety, rationalized licensing, and certification of advanced LWR designs. Supporting all of these R&D efforts will be the continued operation of the unique test facilities and analytical laboratories required for developing and verifying advancements in reactor systems, fuel, components and power conversion systems.

Consistent with the Department's commitment to assure protection of the public and the environment, projects and program activities will continue to be pursued in fulfillment of statutory requirements to conduct remedial actions at abandoned radioactively contaminated sites and facilities. Remedial action projects will be pursued to completion on schedules consistent with program priorities and funding support. The number of projects under way and the scope of work is expanding as a number of these projects move from the planning stage to the implementation stage. Technical assistance will continue to be provided to States to manage low-level radioactive waste and implement formation of regional compacts.

Funding and support of the Energy Supply R&D programs discussed below will lead to: a more stable and predictable reactor licensing process and an improved safety and technological basis for regulatory requirements; additional emphasis in high risk areas of innovation which can simplify the design, construction, and operation of both the current and improved generations of LWR's; development of nuclear power supplies for emerging national security missions involving space and terrestrial applications; a complementary but more limited technological and industrial base that will encourage future deployment initiatives and decisions for advanced commercial reactors by the private sector; and the fulfillment of remedial action and waste technology projects to provide further protection to the environment and public health and safety.

Nuclear Energy Research and Development

The Nuclear Energy Research and Development program develops, in cooperation with industry, advanced technology for improved light water reactor powerplant safety and efficiency; conducts research and development on advanced reactor systems for defense and commercial applications; and operates R&D facilities that support the Nation's nuclear programs. The R&D Program consists of the following activities: Light Water Reactors, Advanced Reactor R&D, Space and Defense Power Systems, Advanced Nuclear Systems, Facilities, and Water Cooled Breeder.

A discussion of these activities that comprise the Nuclear Energy Research and Development budget follows.

Light Water Reactors:

The Light Water Reactor (LWR) Technology activity consists of three interrelated elements: LWR Safety and Licensing; Advanced LWR Technology; and Three Mile Island (TMI) R&D.

The Safety and Licensing element encompasses efforts to improve the operation and availability of LWR's, extend plant lifetimes, improve plant productivity, enhance plant safety, and improve plant licensability. The key features of the activity are: redefinition of the Federal government's regulatory role and enhancing this role with supporting LWR technical R&D activities; establishment of a technology base and prelicensing of important plant improvements to enable the use of current technologies in nuclear powerplants that are presently limited by regulatory procedures; assessment of severe accident source-term issues directed at reducing current source terms; development of new risk-based licensing approaches to support a more stable and predictable licensing process; establishment of a regulatory/technology base for extending Light Water Reactor licenses beyond the current Nuclear Regulatory Commission limit of 40 years; and the improvement of the availability and productivity of operating reactors.

Several Advanced LWR designs are being evaluated as part of complementary DOE and industry research and development programs to identify improvements to current light water reactors. Decisions and actions for deployment of commercial reactors remains with the private sector. The Department's role is to augment industry efforts and to act as a catalyst for innovative improvements to advanced light water reactor designs, which will lessen the future uncertainty and complexity with which regulators must contend, enhance the safety and productivity of reactors, and assure the availability of advanced technology for future power decisions.

The demonstrated removal of the remaining technical, licensing, and institutional impediments to the construction and operation of next generation Light Water Reactors is the overall objective which the complementary government/industry Advanced LWR activities address. A milestone in the pursuit of this objective will be the NRC certification of at least two Advanced Light Water Reactor (ALWR) systems in approximately 5 years. The pursuit of this objective will have the effect of focusing and guiding the DOE and industry efforts in nuclear licensing and institutional reform, safety research, component and systems development and test, and licensing of advanced systems.

TMI support in FY 1987 will continue to focus on developing technology for improving the capability of civilian nuclear powerplants to safely recover from accidents, and conducting research and development to enhance substantially the understanding of factors which improve the safe operation of LWR plants. Fuel removal, which the utility began in the fall of 1985, should be completed by the end of FY 1987. The damaged core will be shipped to the Idaho National Engineering Laboratory (INEL). Portions of the core will be examined at INEL and other laboratories to obtain data needed to improve the current understanding of the progression of severe accidents in addition to the concomitant behavior of the core materials and fission products. The important information garnered from this R&D, based upon actual plant experience, can be used in current and future design, licensing, and regulatory activities. DOE's TMI activities will be completed in FY 1988.

Advanced Reactor R&D:

The Advanced Reactor R&D activity will conduct tests, experiments, and studies in advanced reactor research to support a continuum of both civilian and military energy requirements. FY 1987 will serve as a transition period during which military power needs will be identified, certain activities will be phased out, and the R&D emphasis will be shifted from satisfying primarily the needs of the civilian sector for advanced reactors to satisfying primarily the space and terrestrial power needs for the military.

Though the program emphasis changes, the on-going work and existing resources should provide a complementary and adequate technical base for any future initiative, as led by the private sector, to deploy advanced nuclear technologies in the commercial sector. The Advanced Reactor R&D program will be reoriented to: provide technology to meet emerging and existing NASA or military space and terrestrial nuclear power needs while commercial-specific designs and R&D are phased down; assure the maintenance of a technical, testing, analytical, and design infrastructure to assure capability to respond to the need for civilian nuclear power in the future and transfer appropriate advanced reactor technology to industry for utilization in a future advanced civilian reactor program. The activities envisioned for FY 1987 will preserve the most important elements of the existing program, including some international activities, while making the technical capability of the laboratories and test facilities available for utilization in near-term space and defense applications.

Space and Defense Power Systems:

The Space and Defense Power Systems activity is an integrated set of R&D elements that will develop nuclear power sources to support emerging Department of Defense requirements for a variety of terrestrial and space missions, including the Strategic Defense Initiative Office. It will provide the design, development and supporting technology for building compact, high performance reactors for space and terrestrial applications and dynamic isotope power systems for space application. This activity consists of low power and multi-megawatt power systems. The low power systems include the SP-100 space reactor power system (up to about 1 MWe), the 15 KWe terrestrial Small Nuclear Power Source Demonstration, and the Dynamic Isotope Power System (about 1 to 10 KWe) for space use. The multi-megawatt systems include space reactors that must produce several megawatts of continuous electric power for sustained time periods, as well as hundreds of electrical megawatts for short durations; and a 10 MWe terrestrial powerplant. The USAF has determined that nuclear power may provide a cost-effective and militarily superior source of power for certain missions and has also generated a Statement of Operational Need for compact space power.

The SP-100 project, a multi-hundred kilowatt electric class space reactor power system technology project, will initiate system design, development, test, and facility modification efforts leading to a ground test of a 300 KWe liquid metal cooled space reactor with thermoelectric power conversion, so that SP-100 technology flight readiness can be demonstrated by 1991. Technology activities and scaling studies will also be performed to ensure the application of the SP-100 design over a broad power range, approaching 1 MWe. The Small Nuclear Power Source Demonstration project involves the development of a 15 KWe terrestrial reactor power system as an alternate power supply to update the Distant Early Warning (DEW) line across Northern Canada. Efforts on this project will involve the continued design and subsequent fabrication of a prototype reactor for long-term unattended operations. A demonstration unit should be on test in FY 1987, while a prototype unit may be installed at a North Warning System radar site in FY 1988. The Dynamic Isotope Power System involves design and subsequent development and testing of a rugged radioisotopic heat source with high-efficiency dynamic energy conversion to meet military space requirements.

The Multi-megawatt Space Reactor project will involve the identification and evaluation of very high performance reactor concepts and the development of associated critical technologies in support of SDI space prime power requirements. The Multi-megawatt Terrestrial Power program will continue the design of a nuclear powerplant for ground based SDI assets and other high priority DOD weapon systems and installations which require a hardened and reliable power supply for overall weapon system operability and credibility.

Though primarily designed to meet national security requirements, the reactor and isotope technologies developed in these programs may well have applicability for future space and terrestrial commercial systems.

Advanced Nuclear Systems:

Radioisotope power supplies have been successfully utilized for a number of years; the program thrust now is to improve the technology so as to provide lighter weight, highly reliable, and more efficient power supplies for terrestrial and space application. Nuclear power is an enabling technology for many missions requiring light-weight, highly reliable power supplies up to the kilowatt range.

This activity provides nuclear radioisotope power sources to meet civilian and military applications. For example, two NASA (National Aeronautics and Space Administration) spacecraft launches scheduled for the spring of 1986 (Ulysses and Galileo) will rely on nuclear radioisotope power supplies for all on-board electricity. Likewise, future NASA exploratory interplanetary space launches will rely on advanced radioisotope thermoelectric generators (RTG) to supply electrical power and radioisotope heater units to supply heat to the spacecraft experiments. Improved heat source manufacturing techniques, refractory metal encapsulation developments, and modular system designs will be pursued to enhance the quality of delivered products that meet user requirements and application configurations. The DOE's isotope technology development element is aimed at improving power system efficiency and compactness to enhance overall mission effectiveness and safety.

Fuel form production and encapsulation facilities, along with heat source assembly and testing facilities, will be operated for functional tests and maintained in a state of production readiness to meet military application delivery requirements beginning in FY 1989. Long lead procurements and fabrication of heat source components will begin in support of production requirements for the military 3-watt RTG program, which is a new class of low wattage RTG's for national defense missions. Other system support facilities will be operated, tested and maintained in a state of production readiness to support production operations planned in FY 1988.

Facilities:

The United States operates some of the most advanced and sophisticated nuclear test facilities in the world today for advanced power generation reactors, fuels, components, and materials. The facilities provide essential testing capabilities required for the development of safe, reliable, environmentally acceptable and efficient nuclear energy power sources that will be suitable for space, military and civilian applications. These facilities are also used in: development of fusion technology; cooperative technology programs with other countries; non-nuclear energy programs such as coal, solar, and geothermal; and conducting tests for other Government and private sector organizations such as the Electric Power Research Institute and U.S. Nuclear Regulatory Commission (NRC). FY 1987 will be a transition year for the nuclear reactor test facilities, reflecting the change in program emphasis to support primarily military space and terrestrial energy near-term requirements. Facility operations are directed at conducting required tests to support and verify advances in fuels, core systems, materials, safety, components, and instrumentation and control systems in support of defense, space, and civilian energy program requirements. Facilities are also used to support international agreements and non-nuclear program activities.

Synergistic benefits will accrue to all reactor development projects through the completion and documentation of test results.

A cost sharing approach is being established that provides a more equitable distribution of costs among facility users. This cost sharing approach will be partially implemented in FY 1987, with full implementation planned for FY 1988. Synergistic benefits will accrue to all reactor development projects through the conduct, analysis, evaluation and documentation of the facilities test programs.

Water Cooled Breeder Reactor Technology:

One of the variations of nuclear technology is the use of a uranium-233/thorium fuel cycle. The Water Cooled Breeder Reactor activity has the mission of developing technology that will significantly improve the efficiency of utilizing nuclear fuel resources. The specific objective is to prove that fuel breeding can be achieved in a light-water reactor using the uranium-233/thorium fuel system. The focus of activity efforts in FY 1987 will be to complete evaluation of the light-water breeder core removed from the Shippingport Atomic Power Station to verify breeding, thereby bringing this project to a conclusion in FY 1987.

Remedial Action and Waste Technology

The objectives of the Remedial Action and Waste Technology program are to treat or stabilize radioactive waste and to perform decontamination and decommissioning at contaminated DOE and legislatively authorized non-government facilities and sites; facilitate development of a reliable national system for managing low-level waste; and develop acceptable technologies for the treatment and immobilization of all types of radioactive waste. International cooperation has a significant role in the program, and cost sharing arrangements will be fulfilled and pursued when mutual benefits are identified. Major program activities in FY 1987 are: (1) the Formerly Utilized Sites Remedial Action Project; (2) the Grand Junction Remedial Action Project; (3) the Uranium Mill Tailings Remedial Action Project; (4) the Surplus Facilities Management Program; (5) the West Valley Demonstration Project (6) technical assistance to States and regions to assist them in developing new capacities for the disposal of low-level radioactive waste; and (7) civilian byproducts utilization and applications with primary emphasis on food irradiation.

The description of each of these activities is provided in the following sections.

Formerly Utilized Sites Remedial Action Project (FUSRAP):

The objective of this activity is to provide remedial actions at former nuclear processing facilities that became radioactively contaminated as a result of Manhattan Engineering District (MED) or Atomic Energy Commission (AEC) work, or have been specifically assigned to DOE by Congress. This project provides for removal of contaminated material from properties which are contaminated above current guidelines. The waste from cleanup work is, generally, stored temporarily on the facility site, which was the source of the contamination. Later, the source facility is decontaminated and the waste is either stabilized in place or removed to a host state disposal facility. In FY 1987, remedial action activities will concentrate on five high priority sites: Wayne, NJ; Maywood, NJ; Colonie, NY; Hazelwood, MO, and the St. Louis Airport Storage Site, MO. Remedial action will be initiated at the Albany, OR site and engineering, environmental assessments and other program efforts will continue at other sites and vicinity properties.

Grand Junction Remedial Action Project:

This project, authorized under Public Law 92-314, as amended, provides financial assistance on a cost sharing basis to the State of Colorado to limit radiation exposure resulting from the former use of uranium mill tailings for construction purposes in the Grand Junction, Colorado. This project will complete remedial action on all remaining properties in FY 1987. Final radiological surveys on decontaminated structures and program close-out will be accomplished in FY 1988.

Uranium Mill Tailings Remedial Action Project (UMTRAP):

This project, authorized under Public Law 95-604, covers remedial actions at 24 inactive uranium mill tailings processing sites and several thousand associated vicinity properties. This project will complete remedial action at the processing site and vicinity properties at Shiprock, NM, and Salt Lake City, UT; remedial actions will be continued at Lakeview, OR and Tuba City, AZ and initiated at Ambrosia Lake, NM, Durango, Grand Junction, Gunnison in CO, Mexican Hat, UT, and Riverton, WY; NEPA and engineering design activities at other sites will continue. The Department is proposing legislation to extend the period of authorization and date from March, 1990 to September, 1993. This proposed action is necessary to accommodate the large number of sites and vicinity properties that would be under construction simultaneously, and to incorporate the increased scope and nature of work required to comply with promulgated environmental, health and safety standards. There is no adverse health or safety impact to the public or environment as a result of the proposed change. The total estimated cost (TEC) of the project is projected to increase due to delays encountered in reaching agreement among the many parties involved in remedial action plans, actual site experience, and higher than anticipated costs to meet requirements of the EPA standards, particularly in satisfying ground water requirements and stabilizing tailings located in floodplains, or alternatively, relocating them to new disposal sites. The

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FY 1987 CONGRESSIONAL BUDGET REQUEST
ADJUSTMENTS TO FY 1986 APPROPRIATION
(Dollars in Thousands)

Program	FY 1986 Confer	Gen Reduct	Mgmt Init	Paycost Restore	FTE General Reduct	Gramm Rudman Hollings	ES&H Trans/ Reprog	Sub Total	Comp Adjsts	Total
Civ Byprod & Beneficial Use	5,000	0	0	0	0	-189	0	4,811	-4,811	0
Program Direction-OE	500	0	0	0	0	-19	0	481	-481	0
Subtotal-Nuclear Waste Tec	16,700	0	0	0	0	-632	0	16,068	-16,068	0
Civilian Waste R&D										
Spent Fuel Storage-OE	7,800	-10				-294		7,496		7,496
-CE	1,100					-42		1,058		1,058
Subtotal-Spent Fuel	8,900	-10	0	0	0	-336	0	8,554	0	8,554
Alt Disposal Concepts-OE	5,500					-208		5,292		5,292
-CE	2,000	-10				-75		1,915		1,915
Subtotal-Alt Disposal Conc	7,500	-10	0	0	0	-283	0	7,207	0	7,207
Program Direction-OE	325	-4			-6	-12		303		303
Subtotal-Civ Waste R&D	16,725	-24	0	0	-6	-631	0	16,064	0	16,064
Remedial Actions										
Surplus DOE Facilities-OE	41,350					-1,563		39,787	-39,787	0
-CE	150					-6		144	-144	0
Subtotal- Surplus DOE Fac	41,500	0	0	0	0	-1,569	0	39,931	-39,931	0
Formerly Utilized Sites-OE	19,500					-737		18,763	-18,763	0
-CE	200					-8		192	-192	0
Subtotal-FUSRAP	19,700	0	0	0	0	-745	0	18,955	-18,955	0
Uranium Mill Tailings-OE	94,000					-3,553	-50	90,397	-90,397	0
-CE	1,000					-38		962	-962	0
Subtotal-UMTRAP	95,000	0	0	0	0	-3,591	-50	91,359	-91,359	0
West Valley-OE	64,000	0	0	0	0	-2,419	0	61,581	-61,581	0
Grand Junction-OE	900	0	0	0	0	-34	0	866	-866	0
Program Direction-OE	1,400	0	0	0	0	-53	0	1,347	-1,347	0
Subtotal-Remedial Actions	222,500	0	0	0	0	-8,411	-50	214,039	-214,039	0
Nuclear Energy R&D										
Light Water Reactors-OE									40,158	40,158
-CE									0	0
Subtotal-Light Water Reac	0	0	0	0	0	0	0	0	40,158	40,158
Advanced Reactor R&D-OE									123,432	123,432
-CE									5,118	5,118
-PTI									0	0
Subtotal-Adv Reactor R&D	0	0	0	0	0	0	0	0	128,550	128,550

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
ADJUSTMENTS TO FY 1986 APPROPRIATION
(Dollars in Thousands)

Program	FY 1986 Confer	Gen Reduct	Mgmt Init	Paycost Restore	FTE General Reduct	Gramm Rudman Hollings	ES&H Trans/ Reprog	Sub Total	Comp Admjts	Total
Space & Defense Power Sys-OE									16,367	16,367
-CE									1,924	1,924
-Plt									1,924	1,924
Subtotal-Space & Defense	0	0	0	0	0	0	0	0	20,215	20,215
Advanced Nuclear Systems-OE									17,854	17,854
-CE									1,636	1,636
Subtotal-Advanced Nuc Sys	0	0	0	0	0	0	0	0	19,490	19,490
Facilities-OE									124,173	124,173
-CE									4,503	4,503
-Plt									3,560	3,560
Subtotal-Facilities	0	0	0	0	0	0	0	0	132,236	132,236
Water Cooled Breeder-OE									18,955	18,955
-CE									0	0
Subtotal-Water Cooled Brdr	0	0	0	0	0	0	0	0	18,955	18,955
Program Direction-OE	0	0	0	0	0	0	0	0	8,080	8,080
Subtotal Nuclear Energy R&D	0	0	0	0	0	0	0	0	375,684	375,684
Remedial Action & Waste Tech										
Formerly Utilized Sites-OE									18,763	18,763
-CE									192	192
Subtotal-FUSRAP	0	0	0	0	0	0	0	0	18,955	18,955
Grand Junction-OE	0	0	0	0	0	0	0	0	866	866
Surplus Facilities-OE									39,787	39,787
-CE									144	144
Subtotal-Surplus Facilities	0	0	0	0	0	0	0	0	39,931	39,931
Uranium Mill Tailings-OE								0	90,397	90,397
-CE									962	962
Subtotal-UMTRAP	0	0	0	0	0	0	0	0	91,359	91,359
West Valley-OE									61,581	61,581
-CE									0	0
Subtotal-West Valley	0	0	0	0	0	0	0	0	61,581	61,581

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FY 1987 CONGRESSIONAL BUDGET REQUEST
ADJUSTMENTS TO FY 1986 APPROPRIATION
(Dollars in Thousands)

Program	FY 1986 Confer	Gen Reduct	Mgmt Init	Paycost Restore	FTE General Reduct	Gramm Rudman Hollings	ES&H Trans/ Reprog	Sub Total	Comp Admjts	Total
Low Level Waste-OE									4,474	4,474
-CE									96	96
Subtotal-Low Level Waste	0	0	0	0	0	0	0	0	4,570	4,570
Waste Tech & Byproducts-OE									10,584	10,584
-CE									433	433
-Plt									0	0
Subtotal-Waste Tech & Bypr	0	0	0	0	0	0	0	0	11,017	11,017
Program Direction-OE	0	0	0	0	0	0	0	0	1,768	1,768
Subtotal-Remed & Waste Tech	0	0	0	0	0	0	0	0	230,047	230,047
Total Nuclear	653,050	-20,053	-4,800	-9,699	-189	-24,476	-750	593,083	28,712	621,795
All Other Energy Supply	1,376,221	-2,547	-12,200	-8,123	-400	-51,732	6,900	1,308,119	7,708	1,315,827
Subtotal-Gross Energy Supply	2,029,271	-22,600	-17,000	-17,822	-589	-76,208	6,150	1,901,202	36,420	1,937,622
General Reduction	-22,600							-22,600		-22,600
Prior Year Balances Applied:										
Nuclear-OE		19,301						19,301	-19,301	0
All Other Energy Supply		950						950	-950	0
Management Initiatives	-17,000							-17,000		-17,000
Prior Year Balances Applied:										
Nuclear-OE								0		0
All Other Energy Supply-PLT			6,470					6,470	-6,470	0
Prior Yr Balances Trans From Other Accounts	-217,400							-217,400		-217,400
Other Adjustments:										
Paycost Restoration:										
Prior Year Balances Applied:										
Nuclear-OE				9,699				9,699	-9,699	0
Paycost Absorbed in Other Accounts				6,281				6,281		6,281
Paycost Absorbed in Energy Supply				1,842				1,842		1,842
Totals	1,772,271	-2,349	-10,530	0	-589	-76,208	6,150	1,688,745	0	1,688,745

Department is pursuing measures to reduce and control the costs for performing remedial actions.

Surplus Facilities Management Program:

The Surplus Facilities Management activity provides for the safe management and disposition of designated DOE facilities with an objective of returning to productive use, where appropriate, facilities and sites that have been decontaminated. In FY 1987 dismantlement operations will continue at the Shippingport Atomic Power Station. Remedial actions will begin at the Weldon Spring Site in Missouri and the Power Burst Facility in Idaho, while work will continue or be completed at a number of other facilities.

West Valley Demonstration Project:

Authorized under Public Law 96-368, this project will demonstrate the solidification of high-level radioactive waste at the Western New York Nuclear Service Center, near West Valley, New York. The West Valley Demonstration Project will complete non-radioactive testing of the Component Test Stand. Decontamination of several major shielded cells will be completed, allowing installation of equipment for waste processing and for high-level waste interim storage. Major procurements will be made to begin conversion of the Component Test Stand for radioactive operations to convert high-level liquid waste into borosilicate glass logs suitable for emplacement in the high-level waste repository, currently under development. Other associated activities will support and maintain the revised schedule of operations, with the start of high-level waste solidification planned for early FY 1989. FY 1987 will be the peak year for project funding based upon planned and scheduled expenditures for major equipment procurements and construction.

Low-Level Waste:

During FY 1987, the Low-Level Waste activity will provide technical support and assistance to States and regions for the development of new low-level waste disposal facilities. Assistance in correcting problems at existing disposal sites and in utilizing advanced or innovative methods for the treatment of low-level waste will be continued. The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigns additional responsibilities to the Department relating to the management of civilian low-level waste, assistance to states and regions, and annual reporting requirements to Congress. These new responsibilities are being evaluated and will be satisfied consistent with available resources.

Waste Treatment:

Testing of the high-level waste vitrification system at Pacific Northwest Laboratory using radioactive material will be terminated and the system shut down in FY 1987. Reports on research results obtained in FY 1986 will be completed and commitments to the Federal Republic of Germany (FRG) will be met in accordance with the current DOE/FRG cooperative agreement.

Byproducts Utilization:

This activity will seek cooperative funding from the private sector for completion of several regional agricultural commodity irradiation projects. Efforts will continue for two facilities, funded from prior year appropriations, to develop and transfer technology for the beneficial uses of nuclear waste byproducts.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
NUCLEAR ENERGY RESEARCH AND DEVELOPMENT

Nuclear
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Approp.	FY 1986 Approp.	FY 1987 Base	FY 1987 Request	Request vs Base
Nuclear Energy Research and Development (NE)					
Light Water Reactors					
Operating expenses A/ ...	$ 49,960	$ 48,158	$ 48,158	$ 41,000	$ -7,158
Capital Equipment	1,500	0	0	0	0
Subtotal	$ 51,460	$ 48,158	$ 48,158	$ 41,000	$ -7,158
Advanced Reactor R&D					
Operating expenses	$144,048	$123,432	$123,432	$ 47,000	$-76,432
Capital Equipment	14,690	5,118	5,118	2,500	-2,618
Subtotal	$158,738	$128,550	$128,550	$ 49,500	$-79,050
Space and Defense Power Systems					
Operating expenses	$ 8,722	$ 16,367	$ 16,367	$ 60,370	$+44,003
Capital equipment	50	1,924	1,924	6,280	+4,356
Construction	0	1,924	1,924	5,000	+3,076
Subtotal	$ 8,772	$ 20,215	$ 20,215	$ 71,650	$+51,435
Advanced Nuclear Systems					
Operating Expenses	$ 24,884	$ 17,854	$ 17,854	$ 20,600	$ +2,746
Capital Equipment	1,500	1,636	1,636	3,000	+1,364
Subtotal	$26,384	$ 19,490	$ 19,490	$ 23,600	$ +4,110
Facilities					
Operating Expenses	$124,088	$124,173	$124,173	$115,200	$ -8,973
Capital Equipment	1,985	4,503	4,503	2,800	-1,703
Construction	7,800	3,560	3,560	3,800	+240
Subtotal	$133,873	$132,236	$132,236	$121,800	$ -10,436
Water Cooled Breeder					
Operating Expenses	$ 25,000	$ 18,955	$ 18,955	$ 13,800	$ -5,155
Subtotal	$ 25,000	$18,955	$ 18,955	$ 13,800	$ -5,155
Program Direction					
Operating Expenses	$ 8,385	$ 8,080	$ 8,080	$ 9,550	$ +1,470
Subtotal	$ 8,385	$ 8,080	$ 8,080	$ 9,550	$ +1,470
Total					
Operating expenses	$385,087	$357,019	$357,019	$307,520	$-49,499
Capital equipment	19,725	13,181	13,181	14,580	+1,399
Construction	7,800	5,484	5,484	8,800	+3,316
Grand Total	$412,612 B/	$375,684 C/	$375,684	$330,900 D/	$-44,784
Staffing Total FTE's	157	126	126	119	-7

Authorization: Sec. 31, P.L. 83-703, Sec. 309(a), P.L. 95-91, and P.L. 96-567

A/ The FY 1985 column does not reflect a reprogramming action of an additional $5,000,000 for the Loss-of-Fluid-Test (LOFT) program from prior year appropriation (from CRBR termination funds). The FY 1986 column reflects the amended request which reduced the program by $5,000,000.

B/ The FY 1985 funding is net of the following reductions: $-9,040,000 for General Reduction, $-3,792,000 for Small Business Innovative Research, $-7,705,000 for Management Initiatives, and $-2,200,000 for ADP Management Initiatives. The FY 1985 column does not reflect reprogramming, within Energy Supply R&D, of $1,580,000 for North Warning Project.

C/ Adjustments to the FY 1986 appropriations are described in the table following the nuclear overview table in the front of this section.

D/ The FY 1987 funding is net of a reduction of $1,950,000 for Management Initiatives.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
NUCLEAR ENERGY RESEARCH AND DEVELOPMENT
(In thousands of dollars)

FY 1986 Appropriation enacted	$375,684
Built-in increases and decreases	0
FY 1987 Base	$375,684
Program increases and decreases:	
Light Water Reactors	
o Reduced level of effort on severe accident technology	-1,509
o Refocusing of civilian reactor technology efforts to support industry/government program on development of advanced LWR's	+13,430
o Decrease in Three Mile Island R&D as program nears completion	-19,079
Advanced Reactor Research and Development	
o Shift Advanced Reactor R&D emphasis to support national security needs resulting in the following decreases:	
- High Temperature Gas-Cooled Reactor technology	-26,800
- Nuclear fuel cycle technology	-14,376
- Liquid metal reactor technology	-16,462
- Breeder reactor technology	-16,409
- Reactor development support	-5,003
Space and Defense Power Systems	
o Develop engineering design for advanced concepts, and conduct experimental and development efforts on multi-megawatt (MMW) power systems in support of the President's Strategic Defense Initiative (SDI)	+21,822
o Conduct preliminary design work on Multimegawatt Terrestrial Power Plant Project for the U.S. Air Force and the President's SDI	+3,000
o Increase for contractor design efforts, component development and testing, fuels and materials development/fabrication and testing, safety and design audits, and test facility preparation in support of Ground Engineering System (GES) development and testing of SP-100 space reactor technology flight readiness for SDI, non-SDI military, and civilian space mission applications in the 1990's and beyond	+14,019

o Planned reduction in support of the Small Nuclear Power Source Demonstration Reactor (SNPSDR) for long-term unattended military and civilian use in remote areas	-406
o Continue technology development of 1-10 KW(e) Dynamic Isotope Power System (DIPS) in support of the President's SDI	+13,000
Advanced Nuclear Systems	
o Increase design and development of isotopic power systems, nuclear facilities preparation, heat source development, and safety efforts in support of forthcoming civilian, military, and NASA programs	+3,776
o Increase radioisotope thermoelectric generator (RTG) design concepts and reliability testing for terrestrial applications	+334
Facilities	
o Decrease is due to redirection of facility efforts to primarily support space and defense energy requirements, and additional cost sharing provided by other programs to cover their use of facilities	-10,436
Water Cooled Breeder	
o Planned decrease in defueling and core evaluation efforts	-5,155
Program Direction	
o Increase necessary to cover total estimated FY 1987 costs; prior year carryover funds supplemented FY 1985 and FY 1986 requests...	+1,470
Total	$330,900

	FY 1986 Approp.	FY 1987 Request
Nuclear Energy Research and Development (R&D)		
Operating expenses	$357,019	$307,520
Capital equipment	13,181	14,580
Construction	5,484	8,800
Total	$375,684	$330,900

The Nuclear Energy (R&D) program develops, in cooperation with industry, advanced technology for improved powerplant safety and performance; conducts R&D on advanced reactor and radioisotope power systems for defense, space, and commercial applications; and operates R&D facilities that support all of the Nation's nuclear programs.

Nuclear power's applicability to a wide variety of uses is apparent from a look at the applications supported by the nuclear R&D budget. Technology developments to improve performance of current and future powerplants, special power sources to meet demanding temperature and reliability requirements of outer space, power sources to provide power at remote military and civilian locations, special power sources to meet unique requirements of the Strategic Defense Initiative (SDI), radioisotope power sources for terrestrial and space applications, and R&D on advanced reactor systems for commercial power application in the future are some of the activities in Nuclear Energy R&D.

Nuclear Energy R&D is conducted in within six activities: Light Water Reactors (LWR's), Advanced Reactor R&D, Space and Defense Power Systems, Advanced Nuclear Systems, Facilities, and Water Cooled Breeder. The objectives of each technical activity are summarized below; all the activities are described in detail in the narratives that follow.

From the experience accumulated to date on LWR research, development, design, construction, operation, and regulation, it is evident that major national benefits can be realized by advancements in each of these areas. Consistent with industry responsibilities, programs are already underway by the reactor manufacturers and the electric utility industry to exploit these opportunities on the existing generation of LWR's.

The demonstrated removal of the remaining technical, licensing, and institutional impediments to the design, construction, and operation of next generation LWR's is the overall objective that the complementary government/industry Advanced LWR (ALWR) programs address. A milestone in the pursuit of this objective will be the U.S. Nuclear Regulatory Commission (NRC) final design approval and certification of at least two ALWR systems in approximately 5 years. The pursuit of this objective will have the additional benefit of focusing and guiding the U.S. Department of Energy (DOE) efforts in nuclear licensing and institutional reform, safety research, component and system development and testing, and in licensing of advanced systems.

Advanced Reactor R&D is an activity that encompasses studies, tests, and experiments in reactor systems, core systems, and fuels and materials. This activity provides the knowledge base needed to support a continuum of civilian, defense, space, and terrestrial requirements with emphasis on near-term national security requirements, including the SDI. Remote, unattended operation, hardened sites, logistical independence from fuel supply lines, long-life fuels and systems, high acceleration pumps, and increased thermal heat removal are all necessary to meet the unique requirements of defense and space systems. An emphasis on meeting defense-oriented program needs will not affect the essence of the nuclear R&D program but will generate some new activities to address these unique requirements. Similarities are likely to exist among applications for military and civilian purposes, and efforts will be made to assure that fundamental R&D work will provide technology support for both civilian and military applications.

The reactor systems element will: determine the applicability of existing concepts to emerging military and SDI requirements, continue testing system features that meet both military and civilian requirements, and investigate advanced system control approaches. The core systems element includes: thermal hydraulic testing of advanced designs to demonstrate coolant circulation, in-reactor core and system response testing, modifying calculation codes to predict performance of new designs, and conducting tests on seismic response. The fuels and materials element will involve advanced fuels testing and fabrication and the development of high temperature cladding and structural materials for defense and high temperature applications in space and terrestrial systems. Work on the civilian advanced reactor program towards long-range applications will continue at a substantially reduced funding level.

The Space and Defense Power Systems activity is an integrated set of R&D activities that supports the national defense energy needs (i.e., both SDI and non-SDI military energy needs) and offers alternative energy supply sources to conventional fossil-based fuels. The activity has two main areas of emphasis: low power systems efforts (up to several hundred kilowatt electric (kWe)) and multimegawatt (MMW) power systems. The main elements of the low power systems are: SP-100 space reactor technology, the Dynamic Isotope Power System (DIPS) and the Small Nuclear Power System Demonstration Project (SNPSDP). The main elements of the MMW power systems are: the MMW Space Power System and the MMW Terrestrial Powerplant (MTP).

The Advanced Nuclear Systems activity develops, demonstrates, and delivers radioisotope power sources for military and civilian space and terrestrial missions. These isotope power supplies are fabricated and provided to Federal agencies to fulfill various applications that range up to 1 kWe. Two elements comprise the activity: the Radioisotope Thermoelectric Generator (RTG) program and special applications.

The Facilities activity provides the operational test environments essential for developing and verifying advancements in reactor systems, fuel, and power conversion equipment technologies for civilian as well as space and defense reactor applications. Such testing capability is critical to resolve the technical and cost uncertainties of these technology developments and confirm that the nuclear program mission objective to develop high performance, more reliable advanced reactors is being met. FY 1987 facilities activities will support civilian, space, and defense efforts. Test programs will also be conducted in support of international agreements, other DOE programs, and non-DOE programs on a cost-sharing basis. A new cost-sharing approach will be established for operating the test facilities that more equitably distributes costs among users and establishes an integrated DOE approach to facility utilization. This approach will be implemented to the extent practicable in FY 1987.

The Water Cooled Breeder activity will be completed in FY 1987, and it continues work associated with defueling the Shippingport reactor and core evaluation R&D to verify core performance and breeding characteristics.

	FY 1986 Approp.	FY 1987 Request
Light Water Reactors (LWR's)		
Operating expenses	$ 48,158	$ 41,000
Total	$ 48,158	$ 41,000

Maintaining a competitive U.S. technical capability and enhancing the safety, reliability, and cost performance of existing and new LWR's are important national needs. These needs can be met through cooperative and complementary actions by industry and Government:

o to improve the safety, reliability, and economics of the older generations of plants operating and under construction in the United States;

o to complete the development and acceptance of LWR designs able to be ordered for new or replacement capacity in the next 5 to 15 years;

o to explore innovative longer term reactor concepts with the potential for significantly reduced cost, investor risk, and enhanced safety for possible deployment after the year 2000.

The elements and FY 1987 funding levels of the LWR activity are: LWR Safety and Licensing ($11,000,000), Advanced LWR Technology ($18,000,000), and Three Mile Island (TMI) R&D ($12,000,000). The FY 1987 funding request is a $7,158,000 decrease from the FY 1986 appropriation. The requested level will permit a redirection of the activity to support a cooperative program with industry that will lead to final design approval and certification of advanced LWR's. This activity will support efforts to secure lasting improvements in the regulatory process, in part as a consequence of the removal of technical, licensing, and institutional impediments to the use of current and future LWR's.

Safety and Licensing (Operating expenses):

By 1987, more than 100 nuclear plants will be generating approximately 20 percent of the Nation's electricity. The use of nuclear power has substantially increased our energy security, by greatly reducing the dependence on imported oil in the United States, Europe, and Japan. A maximum of 14 additional units are scheduled to come into operation in the United States between 1987 and 1992. The U.S. regulatory system is generally regarded as a major barrier to the further utilization of this important energy option.

A major reason for this unnecessary limitation on LWR deployment is the Federal regulatory system, which many view as slow, cumbersome, and ineffective. The FY 1987 LWR activity reflects an increased emphasis on redefining the Federal Government's regulatory role and synchronizing this role with LWR technical R&D efforts. Efforts aimed at enabling the development and utilization of advanced systems will complement reform of the Federal regulatory system.

The central requirement in the Federal regulatory scheme is to assure the safety of nuclear powerplants. This consists of both a technical component as well as an understanding of economic impacts of the means used to regulate safety. The changing positions, policies, and regulations affecting the LWR industry have disconnected the technology from its value to end users. Clear and consistent policies affecting the technical basis for LWR construction and operation will provide the framework for a coherent regulatory policy at both the Federal and State levels. The technology is desirable and effective; but its availability as a future option is threatened. Industry must be able to meet the legitimate needs of regulators at the State and Federal level. However, the regulatory process itself must be rationalized to meet the needs of the next decade and beyond.

This element contains those tasks that support reform of the safety regulatory process, including where appropriate, participation in cooperative programs to facilitate the development and certification of improved systems for use in existing and future plants.

A critical task under this element is continuing the severe accident technology program. Fuel damage testing conducted during prior years, culminating in completion of the Loss-of-Fluid-Test program in FY 1986, provide the basis for evaluation of fuel damage tests. Sound technical analyses, including technical consensus on models and data for LWR's, will be the focus in FY 1987.

The goal is to develop and apply a severe accident methodology incorporating results of all recent experimental work and incorporating an understanding of the ability of operator actions to reduce the consequences of accidents through more informed decisionmaking in the control room. Effective consensus in this area is crucial to regulatory reform and a better understanding of the requirements for emergency preparedness at both the local and Federal level.

Concurrently, risk-based licensing techniques will be developed and coordinated with the NRC's August 8, 1985, policy on severe accidents. General agreement has been reached on the use of risk-based techniques, and application of such techniques to achieve improvements in the regulatory process is growing . What remains to be done is to apply these techniques in the consideration of design choices for future reactors. Procedures for considering alternative design features or alternative means of complying with safety standards will be developed and applied. Work in this area will provide increased confidence that advanced LWR designs meet all licensing and utility requirements for economic performance.

The third major effort in this element is a cooperative industry-Government program to extend the productivity of existing and future LWR's. The equivalent of 20 new LWR's could be realized through practical improvements in availability and lifetime of existing LWR's. Plant availability activities will be largely conducted through individual efforts at various operating plants or through more generic programs by the Electric Power Research Institute (EPRI) and industrial suppliers. However, the Department will sponsor selective studies to evaluate overall U.S. practices versus those of other countries and to participate in cooperative programs to enhance utilization of Government-owned facilities and laboratory expertise.

In FY 1987, we intend to concentrate on delineating which LWR key structures and components can continue in service beyond 40 years without replacement or refurbishment. Concurrently, the licensing requirements affecting this group will be examined. Those parts that would require replacement or substantial modification will be evaluated in terms of cost, affect on safety, and in the context of licensing. This effort could lead to not only a more rational Federal regulatory approach, but also provide a more informed basis for State regulatory evaluations of the economics and the safety impacts of investments in improved plant performance.

State regulatory bodies have continually urged utilities to adopt longer operating cycles between refueling shutdowns due to the economic penalty as well as the loss of baseload capacity to their systems. Efforts over the last 10 years on extended burnup have provided substantial benefits to the participating utilities. Consistent with the FY 1986 Congressional appropriation in this area, the Department has initiated a closeout of Federal involvement in this program. During FY 1986, Federal involvement will be completed in 9 of the 11 extended burnup projects. Now the focus is shifting to the state regulator to provide incentives to the utilities to continue this R&D. It should be noted that the incentive should reflect the reduction of spent fuel generated.

The shared and complementary responsibilities of State and Federal regulators provide many opportunities for intervention in large construction projects. Analyses will continue so as to identify these regulatory practices that would better balance the economic risks and benefits of investments in nuclear power projects while maximizing economic and other interests for the ratepayers and public at large.

Advanced LWR Technology (Operating expenses):

U.S. firms have participated in major programs in Japan to develop designs for Advanced LWR's. The U.S. electric utility industry has begun a smaller effort to draw upon the results of this program as part of an effort to enable the development of improved LWR's for the U.S. market. Until a more efficient and disciplined regulatory process has been proven, work on new safety systems and technologies will require some level of DOE support. A cooperative DOE-industry program has recently been initiated through a Memorandum of Agreement (MOA) with EPRI, at the request of the utilities, to assure that the lessons from U.S. past experiences have been successfully applied to these new designs. This effort, based on evolutionary advances in existing LWR technology, is directed at developing detailed requirements for future LWR's of the general size and type of advanced LWR's that U.S. vendors have been developing for sale both here and abroad. These modern designs represent R&D investments of several hundreds of millions of dollars. Further concept development is underway in selected areas where opportunities for substantial improvements in licensability and economic performance can be obtained through modest extension of current, proven technology.

The Advanced LWR element includes the development of innovative strategies for application of LWR technology. In the early 1970's, when the U.S. nuclear industry was thriving on high load growths, assumed economies of scale drove plant ratings from the intermediate range (400-800 megawatts electric (MWe)) to about 1000 MWe. The lower load growths projected today, combined with difficult utility financial situations, may indicate that plants with smaller ratings and lower total capital cost are needed if the U.S. nuclear option is to be preserved. This thinking has led some U.S. reactor manufacturers to develop small LWR concepts, which build on the extensive experience base but with innovative design features (based nonetheless on evolutionary advances into existing LWR technologies) that could contribute to increased margins, designs that are less sensitive to regulatory impact, and offer reduced construction periods and reduced total plant costs. Because of the relatively large resources needed to develop such designs and the uncertain potential for payoff, these concepts have been developed only to a very preliminary stage. Both the market and the regulatory process are too uncertain to justify the financial investment necessary to carry the design concepts to a stage at which their potential can be adequately assessed. Through the cooperative efforts of NRC, DOE, EPRI, utilities, and suppliers, the way can be paved to complete the development and acceptance of Advanced LWR's as an attractive energy option for the future.

In FY 1987, the following activities, supplemented by data from advanced converter reactor technology activities, will be pursued. Each of these will be closely coordinated with other system development programs conducted under the cooperative program with EPRI/industry:

- System design improvements to reduce the sensitivity of plant safety to transients, or to accommodate transients and off-normal events in a more passive manner, leading to reduction in the number of scrams and required operator or automatic control actions.
- Enhanced margins in existing reactor containments and other containment design improvements.
- Improved systems, components, and configurations to facilitate maintenance.
- Improved decay heat removal systems employing more passive design elements or functions, such as natural circulation cooling.
- Reduction of plant protection systems to failures in auxiliary systems to reduce the need for regulatory involvement or oversight.
- Costs and other implications associated with use of innovative construction techniques and the modularization or prefabrication of systems to achieve improvements in construction, operations, and plant life time.
- Development of new methods for combining manufacturing acceptance testing, site operational checkouts, and longer term operational monitoring so as to address a wide range of regulatory requirements in an assured and stable manner.
- Development of a technical/regulatory basis for improved control rooms, innovative LWR sensors to reduce challenges to plant protective systems, and increases in plant availability.

TMI R&D (Operating expenses):

The objectives of the TMI element are to develop the technology that will improve the capability of civilian nuclear powerplants to safely recover from accidents and to conduct relevant R&D that will substantially enhance nuclear powerplant safety and operation. There are two primary subelements within this activity, and these will be conducted in FY 1987: (1) TMI Waste Immobilization, primarily completed in FY 1985, and Reactor Evaluation and (2) Data Acquisition Program.

The TMI activities are implemented in accordance with a Memorandum of Understanding (MOU) signed by DOE, NRC, EPRI, and GPU Nuclear Corporation. The Department will obtain important R&D information that would not otherwise be available from the planned GPU TMI-2 cleanup effort. Responsibility for the costs of TMI cleanup remains with GPU, the owner of the facility.

Recent examinations and analyses have indicated that a substantial quantity (up to 20 tons) of core material is in the bottom of the reactor vessel, below the lower grid plate. The current GPU schedule projects the completion of fuel removal from the original core region by the end of FY 1986 and removal of the remaining fuel from the bottom of the reactor vessel and from primary system components by the end of FY 1987. Removal of fuel from the reactor vessel bottom is an unforeseen complication of the accident, as is the removal of the complex core support assembly that is also believed to contain a substantial quantity of relocated core material.

Beginning in FY 1986, the damaged core will be collected for shipment to a DOE laboratory for examination and interim storage. During FY 1987, DOE will terminate its onsite activities.

Data acquisition is a key element of the TMI R&D program. Specifically, DOE is funding R&D in terms of data gathering and analysis in the following major areas: instrumentation and electrical equipment performance; severe accident analyses, including the behavior of radioactive fission products (source term); data system and sample archiving; and offsite fuel debris examination. EPRI is providing mechanisms to assist in transferring this technology to industry.

Efforts in FY 1987 will be to conduct the offsite examination of the damaged TMI-2 reactor core at Idaho National Engineering Laboratory (INEL) and other laboratories and to transfer the technology to industry. The core examination will provide unique information on full-scale reactor-wide variations in fuel rod damage timing and mechanisms that include core degradation phenomena and related coolability issues; fission product release, deposition, and retention mechanisms; recriticality; and segregation of fuel and control rod materials during severe accidents. This work will provide the necessary data for evaluating present licensing criteria and requirements; developing future licensing criteria; and assessing and developing computer models that are necessary to analyze the course and consequences of severe accidents to mitigate the effects of such accidents. DOE's involvement in this effort will be completed in FY 1988. It is DOE's expectation that any additional R&D undertaken in connection with this program beyond FY 1988 would be the responsibility of GPU and industry.

	FY 1986 Approp.	FY 1987 Request
Advanced Reactor R&D		
Operating expenses	$123,432	$ 67,000
Capital equipment	5,118	2,500
Total	$128,550	$ 69,500

During FY 1987, Advanced Reactor R&D efforts will shift from focusing on civilian to focusing on military, space, and terrestrial energy needs. The efforts in FY 1987 will result in reductions from the FY 1986 base. These reductions are $43,262,000 for High Temperature Gas-Cooled Reactor (HTGR) technology, and Liquid Metal Reactor (LMR) technology, $16,409,000 for Breeder technology, $14,376,000 for Fuel Cycle technology, and $5,003,000 for Reduced Enrichment for Research and Test Reactors (RERTR).

Advanced reactor R&D will be reoriented to: phasing down commercial-specific designs and R&D while using existing technological advances to meet emerging and existing military terrestrial and space needs; maintaining an emphasis on civilian reactor applications where such needs overlap military needs; assuring the maintenance of a technological, testing, analytical, and design infrastructure to respond to the needs of the commercial sector as they materialize; and assuring a capability to spin off technological advances for utilization in a future advanced commercial reactor program. The activities envisioned for FY 1987 will preserve some important elements of the existing program, including some international activities while making the technological capability of the laboratories available for increased utilization toward space and defense applications.

A change of this nature, of course, will require a transition period. FY 1987 will serve as a transition time during which military needs will be identified, certain technological activities will be phased out, and the R&D emphasis will be shifted to provide the most efficient support of nuclear power needs. There is an existing data base in the country today on commercial and developmental power subsystems and components. However, these power subsystems and components were not developed for strategic defense application requirements, and thus the current configurations will not fully meet these requirements and/or may have adverse impacts on the overall systems. Further consideration needs to be given to many essential military technical issues, including duty cycle, effluent management, waste heat management, logistics, and survivability. It is anticipated that a transition as described will result in a program in FY 1988 that will be synergistic to the needs of military systems and civilian reactor systems.

Cooperative testing, design, and analytical programs on advanced reactors with the European nations and Japan will be continued, including private sector interactions, in the areas where the applications of results serve our prospective advanced commercial reactor needs. Examples of cooperative programs utilizing unique U.S. testing capabilities and expertise are advanced fuel performance and optimized reactor shielding and core configurations. Cost-shared arrangements will be developed to enable the United States to remain knowledgeable and a part of the world move towards increased energy security through advanced reactor development, as well as maintaining a voice in the international nuclear nonproliferation regime.

Efforts within the Advanced Reactor R&D activity are based on the technology developed for HTGR, LMR, and breeder reactor concepts and are conducted under three primary elements: reactor systems, core systems, and fuels and materials.

Reactor Systems:

In FY 1986, based on the selection of a small modular HTGR concept, design of the reference HTGR candidate concept will be initiated to begin development of the level of design detail needed to support assessments of plant safety, reliability, operability, maintainability, modularization, constructibility, licensability, and economics. The HTGR data base is complemented by developmental data for very high temperature materials, which would be used in future HTGR process heat and/or defense applications.

Support technology development activities are focused during FY 1986 in the areas critical to the modular HTGR design assessment and licensing. Although priority will be placed on design and licensing activities, work will continue principally on development and qualification of fuels, graphite, and alloys for service in a modular HTGR. Plans are being developed and work initiated to verify fuel performance and fission product behavior to support the licensing basis for the modular HTGR design.

During FY 1986, emphasis within the LMR technology area is being placed on refining system concepts and plant arrangements by utilizing the preliminary concepts, plant requirements, and criteria developed during FY 1985. Studies and assessments are being conducted to enhance the objectives of cost competitiveness, improved safety and ease of licensing, plant reliability, marketability, and utilization of current technology. Technical analyses and evaluations emphasize constructibility, availability, safety, seismic response, thermal hydraulics, and system transients. Preliminary cost estimates, construction schedules, and R&D support requirements are being refined. The evaluation process includes independent reviews and assessments by national laboratories, utility organizations, and NRC in the form of preliminary licensing reviews and the generation of safety criteria. Technical support to the advanced concepts is being augmented by information gained from foreign exchange programs, including the DOE/Power Reactor and Nuclear Fuel Development Corporation (PNC) exchange on the MONJU reactor.

LMR technology activities in FY 1986 that are in support of the advanced designs include documentation of materials design data, including modified 9 Cr-1 Mo steel, technical support for inducer pump testing, flexible joint testing, and control studies for modular plant concepts. Feature tests in support of the advanced designs include heat transfer verification of the reactor auxiliary cooling concepts utilizing radiation cooling of extended surfaces and compact insulation development for a submersible electromagnetic pump. Also, model steam generator development will be pursued to support the requirement for improved performance predictability and reliability. R&D in support of other high risk components and features will also be pursued.

During FY 1987, the commercial advanced converter conceptual evaluations will be phased down and redirected to determine the applicability of existing concepts to emerging military/space needs. Design lessons learned will be applied where applicable to existing DOE SDI programs. R&D specific to military needs will be identified and conveyed to the technologists for R&D planning uses. Only crucial key features tests will be conducted as part of the orderly closeout of civilian reactor-unique hardware testing. Testing programs of features that have application both to military and civilian reactor requirements will be identified, and such testing will be continued. Planning for the conduct of military-specific tests will be initiated. New plant control schemes as necessary to meet military environments will be identified, and R&D will be conducted to support those needs, and civilian reactor program needs, where they overlap.

Emphasis in the international program will be directed toward improving and enhancing interactions between the United States and Japan as well as Europe. The program will be designed to maintain a minimal viable capability with U.S. vendors in commercial plant design, especially retaining, to the degree possible, the U.S. capability to deploy advanced converters and breeder reactors as the need arises.

Other FY 1986 efforts include the RERTR project to develop a low-enriched uranium (LEU) (LEU-20 percent U-235) fuel for foreign research and test reactors now using highly-enriched uranium fuels. The objective of this project is to demonstrate performance and commercial fabrication capability for alternate LEU fuel systems for the conversion, licensing, and use of the LEU fuels with minimum impact on economics or testing capability for the reactor owners/operators. In FY 1986, full core demonstration activities of an LEU-silicide fuel system will be conducted in the Oak Ridge Research Reactor. Proven performance of this fuel will allow conversion of most of the so-called high performance reactors that are the large consumers of highly enriched uranium fuel. Prime focus of the program in FY 1986 will move from technology development to actual conversion of the reactors, which falls under the responsibility of the Department of State or the Arms Control and Disarmament Agency. Therefore, no funds are requested by DOE for this effort in FY 1987 on the basis that the necessary funding should be requested by the other agencies.

Core Systems:

The disciplines of safety, physics, structures, thermal hydraulics, and reactor core design are integrated into a single cohesive effort to investigate key design options for reducing plant complexity, costs, and investment risks and for improving reactor licensability and public confidence. The efforts focus on demonstrating analytically and experimentally the capability of advanced LMR concepts of varied design, size, and fuel type to self-terminate the nuclear reaction process and to protect the reactor core from damage under a variety of conditions.

Accident prevention, e.g., development of concepts and technology that utilize natural phenomena to preclude core disruption, is a key consideration in the thrust of the R&D. Studies on how best to use the positive attributes of sodium coolant to remove decay heat are included. Varied fuel configurations and fuel pin sizes are evaluated, as well as the effects of varied core designs on voiding, temperature, and reactivity coefficients. Efforts to develop an advanced shutdown heat removal capability include feature tests of the most promising concepts for achieving passive, reliable heat removal independent of the main heat transport system. High margin safety/core design activities include investigating core design and analysis (thermal-hydraulic and neutronic) of alternate configurations that show the potential for achieving assured safe shutdown without immediate operator action.

Efforts during FY 1986 include technical support for natural circulation tests to prove the inherent capability of LMR's to respond safely to situations involving loss of forced circulation flow without scram. Results of transient tests are being analyzed to establish safety margins for advanced fuels used in the advanced LMR designs. Benchmark measurements and shielding analyses are being initiated at the Oak Ridge National Laboratory (ORNL) to support cost reductions for the General Electric Company and Rockwell International Corporation advanced designs. A reactor seismic code is being completed that factors in duct test results obtained from DOE and Japanese experiments. In-depth analyses are being conducted for advanced core designs and of alternative heat removal system concepts. The program to demonstrate promising applications of advanced computerized technology to plant construction and operation is being continued. These efforts are closely coupled with continuing efforts to identify new plant control system concepts that will reduce overall plant complexity and improve operational safety of existing DOE facilities as well as the advanced LMR designs.

Other FY 1986 activities include: safety analyses to support the Core Demonstration Experiment (CDE), including safety analyses and evaluation of long-life fuel pin cladding material under transient conditions; run-beyond-cladding breach and transient overpower testing of oxide fuel and blanket pins in the Experimental Breeder Reactor II (EBR-II) under a collaborative U.S./PNC-Japan program; transient tests of high burnup fuel pins from the United Kingdom for computer code validation under the Prototype Fast Reactor/Transient Reactor Test Facility (TREAT) agreement; continuation of a shared cost cooperative Computerized Reliability Data Bank data collection program; and a systematic study with PNC of reactivity feedback effects and core design options that can be used to assure high safety margins in advanced LMR's.

Planned activities for FY 1987 include thermal hydraulic testing to support both military and civilian needs. This work will be brought to a close when sufficient information has been developed to establish the case for passive decay heat removal capability. Such results will be combined with in-reactor inherent safety core and system response testing. When available, military needs will receive greater emphasis in establishing test programs. It is anticipated that military needs will differ primarily in the requirements for fast moving control rod systems, high acceleration pumping capability, increased thermal heat removal requirements, protected heat sinks, hardening of control systems, and certain other structures against environments anticipated during military engagement situations. Fast ramp control schemes will be identified, and their effect on core kinetic response and heat removal capability will be investigated. Instrumentation and control system will be developed that have a fast response capability and that are hardened to survive harsh environments. Tests and analyses will be conducted to show the ability to withstand seismic and other high-shock loadings. Existing calculational codes will be modified to reflect the above testing data and emerging military needs.

Fuels and Materials:

The primary focus of fuels and materials activities is to verify required service lifetimes of core components. To accomplish this, component tests are performed under prototypic operating conditions to exposure levels equal to and exceeding their anticipated service lifetimes. Subsequent examination and analysis of these prototypes ensure the reliability and licensability of similar components intended for power-producing applications.

During FY 1986, fabrication of the 23 long-life core assemblies is being completed utilizing advanced cladding and duct material to support the CDE. Sixteen of these assemblies are being placed into the Fast Test Reactor to begin an irradiation test program that will demonstrate a threefold or greater increase in core life and a corresponding reduction in reprocessing requirements.

Nuclear Fuel Cycle activities in FY 1986 focus on smaller, remotely operated and maintained reprocessing equipment and systems that have the potential for providing economic throughputs in smaller facilities and enable corresponding reductions in plant size and capital costs. The technical program was established to develop the basis to reduce radiation exposure to workers, increase environmental protection, increase reliability, enhance both domestic and international safeguards, and reduce operating costs.

The fuels and materials activities in FY 1987 will place emphasis on the identification of the limits of performance of fuels in military and space missions and, in particular, those missions needing burst-type operations. In addition, R&D will also be conducted in high temperature and high strength cladding and structural materials for defense applications as well as for space and certain civilian applications. Nuclear Fuel Cycle activities will be phased down and redirected towards application of remote systems technology in support of civilian, space, and defense energy needs and towards fostering further international fuel cycle collaboration.

(Capital equipment):

The requested funding will provide for the procurement of special test hardware, such as thermocouples, pressure transducers, and instrumentation that are necessary to conduct planned experiments. In addition, the funding will provide for fabrication of test articles for TREAT transient tests, laboratory support equipment, and data acquisition equipment for safety tests.

	FY 1986 Approp.	FY 1987 Request
Space and Defense Power Systems		
Operating Expenses	$ 16,367	$ 60,370
Capital Equipment	1,924	6,280
Construction	1,924	5,000
Total	$ 20,215	$ 71,650

The Space and Defense Power Systems activity provides the design, development, and supporting technology for compact, high performance nuclear power systems for space and terrestrial defense and civilian applications. Although efforts are focused primarily at SDI and other military applications in the near term, the developed systems will have applicability for future space and terrestrial commercial systems.

The activity has two main areas of emphasis: low power systems and MMW power systems.

The low power systems area and associated FY 1987 funding include the several hundred kWe SP-100 reactor system at $30,000,000 and the 1-10 kWe dynamic isotope power system at $13,000,000 for space applications, and a 15 kWe reactor at $2,000,000 for remote terrestrial applications.

The MMW power systems area also involves space and terrestrial defense applications that are funded in FY 1987 at $23,650,000 and $3,000,000 respectively. The space effort involves a MMW space reactor technology that can provide several megawatts of continuous power and hundreds of megawatts of burst power in support of the SDI. The primary focus of the terrestrial effort involves the design and construction of a 10-MWe minimally attended reactor plant that could provide secure power for military logistic centers, U.S. Air Force (USAF) installations, and ground-based components of the SDI.

Both the space and terrestrial defense efforts build on existing technology developed in the civilian reactor program. However, the space efforts will require extension of the technologies into higher temperature regions and more exotic materials in order to meet the stringent weight and size constraints of the space systems. In all of the applications, the nuclear power systems offer distinct advantages that, for many missions, cannot be satisfied with other power systems.

Low Power Systems

A major effort to satisfy low power needs is the SP-100 Space Reactor Ground Engineering System, as part of a triagency program in support of both SDI and non-SDI military missions and future civilian missions. Another focus is on the development of a 15-kWe unattended terrestrial reactor as a potential alternate power source for the military's short-range radar sites in the modernization of the Distant Early Warning (DEW) line across Northern Canada. The third effort in the low power systems area is the Dynamic Isotope Power System (DIPS) under joint development by the U.S. Department of Defense (DOD) and DOE to meet power requirements in the 1-10-kWe range for military spacecraft.

SP-100 Ground Engineering System (GES) (Operating expenses):

In 1983, the DOE, the National Aeronautics and Space Administration (NASA), and the Defense Advanced Research Projects Agency (DARPA) entered into a MOA to jointly investigate, develop, and fund Space Reactor Power System Technology in the hundreds of kWe power class (up to approximately 1000 kWe). The DARPA role was subsequently transferred to the Strategic Defense Initiative Organization (SDIO) within DOD. The initial objective of this triagency program was to establish the technical and safety feasibility of and advance the technology related to safe, compact, light weight, and durable high performance space nuclear reactor power systems of several hundred kilowatts. With the successful achievement of this initial program objective during FY 1985, the next objective is to develop and demonstrate this enabling technology so that it will be available to a broad class of emerging military and civil space applications in the early to mid-1990's and beyond.

Because of the need for a space power system on the order of several hundred kWe in the relatively near term for both military and civilian applications, the focus has been on reactor power system technology that could satisfy on-board space electrical power requirements in the range of hundreds of kilowatts up to approximately a megawatt. Potential military applications span the entire spectrum of SDI and non-SDI military space needs, including survivable communications; surveillance, acquisition, tracking, and discrimination; electronic countermeasures; propulsion, orbital transfer, and stationkeeping; and a variety of other applications, such as weapons platform quiescent power and cryogenic cooling, assembly and maintenance staging platform power, etc., as well as classified mission applications. Potential civilian applications of the technology include the NASA growth space station, propulsion, orbital transfer, and stationkeeping; communications; navigation; and experiment instrument systems for future planetary and lunar missions.

As an integral part of the triagency Space Reactor Power System Technology program, missions analysis, requirements definition, and user interfaces have been investigated. These efforts are now beginning to bear fruit. The using community is now keenly aware of the program and the advantages that a nuclear power system can offer. In particular, the USAF has generated a Statement of Operational Need for compact space power. In general, the using community now recognizes: the critical need for improved space power systems; nuclear power as an enabling technology; the obvious potential of nuclear systems; that power system technology development must proceed; and the need for power system demonstration--all so that power system availability for dedicated use will match projected mission launch dates. In addition, positive steps within the using community have been initiated to assess reactor power system technology and to complete the necessary planning for the established SP-100 reference mission so that firm dedicated mission commitments can be made for the technology. A planned 300-kWe SP-100 nuclear electric propulsion flight demonstration for SDIO in FY 1993 was established in September 1985. This reference mission will serve to demonstrate and flight qualify SP-100 for follow-on dedicated mission use. Preliminary reference mission planning will be completed in mid-1986. Funding for this planned flight demonstration has been programmed by the SDIO in their outyear budget projections starting with FY 1987.

The overall SP-100 project is comprised of three phases as follows:

- Phase I: the Technology Assessment and Advancement Phase (1983-1985), which included conceptual design studies and assessment of technical and safety feasibility,

- Phase II: the Technology Flight Readiness Phase (1986-1991), which involves design, engineering development, and ground demonstration testing of a selected system concept, and

- Phase III: the Flight System Production, Qualification, and Demonstration/Application Phase (approximately 1991-1993), which involves flight unit production and qualification, payload integration, launch vehicle mating and launch support, launch, and actual operation of the system in space.

Phase I resulted in the successful establishment of concept technical and safety feasibility as well as downselection to one system concept. Concept selection of an out-of-pile reactor thermoelectric system and the selection of a 300 kWe power level for ground demonstration testing during Phase II were both made in early August 1985. In addition, the Hanford Engineering Development Laboratory (HEDL) in the state of Washington was selected as the preferred site from among five existing candidate DOE sites for GES testing during Phase II. This will allow the engineering development and ground test program to start as planned in FY 1986. The management issues associated with the Phase II efforts have also been resolved and an updated MOA among the several participating agencies was signed in October 1985. Under this agreement, DOE has the responsibility to carry out the GES development and testing portion of the overall triagency SP-100 Phase II Program.

The FY 1987 request and outyear estimates are targeted toward completion of the GES development and testing effort by 1991. The objective of this effort is to develop a manufacturing base and obtain component, subsystem, and system performance, safety, lifetime capability, and engineering data sufficient to demonstrate technology flight readiness and support a flight program. A competitive solicitation has been undertaken to select the system development contractor for the GES effort by issuance of a Request for Proposals in November 1985. This solicitation is expected to culminate with placement of a contract by late-summer 1986. The detailed design for the selected system concept (reactor/thermoelectrics) can then proceed. Specifically, in FY 1987, the preliminary reference flight system design at the component level will be completed and major progress will be made on the GES design. Procurement of long-leadtime materials, primarily refractory metals, can also be initiated, as well as the continuation of safety analysis, design audit, and power system/technology scaling studies. Detailed design of many of the components will be completed, and component fabrication and testing will be undertaken on items, such as the liquid metal pumps, heat exchanger, reactor shield, power conversion subsystem, heat pipes, etc. Major effort will also continue on the required environmental and safety documentation for the ground test. These efforts will continue through FY 1987 and will constitute the major focus of the program in that year.

Supporting technology efforts will also continue during FY 1987 to expand the data base of the reactor/thermoelectric system concept and will be used to broaden the data base required to assure that the technology can be successfully demonstrated during the GES effort. Such required technology efforts include continued work on the selected reference fuels technology and fabrication, fuel and cladding compatibility tests, fuel and cladding irradiation tests on the selected fuel/cladding combination, and power conversion, thermal transport, and heat rejection component design, piece part procurement, fabrication, and test.

(Capital equipment):

The GES test effort will require modifications to the selected test site facility, including specialized equipment to support the test program. This equipment will include test consoles, instrumentation panels, sophisticated monitoring equipment, vacuum chambers, pumps, etc.

(Construction):

A decision was made in November 1985 to use the Plutonium Recycle Test Reactor containment facility at HEDL as the preferred site for the GES testing. Substantial modifications will be required at this facility, and the required architecture and engineering design work will have been initiated in FY 1986. FY 1987 funds will result in the completion of most of the design work, receipt of long-leadtime procurement items, and initiation of actual facility modifications.

Small Nuclear Power Source Demonstration Project (SNPSDP) (Operating expenses):

The USAF has identified a need for power systems that can operate continuously in a remote, unattended or minimally attended mode with high reliability, low maintenance, long lifetime, and simplified logistics. Nuclear reactor technology appears to provide feasible and improved alternatives to conventional power systems, such as diesel generators. As a result, a cooperatively funded project is underway to assess and develop a nuclear power source for this application and for possible civilian uses as well.

The SNPSDP involves the design, development, and testing of an unattended 15 kWe reactor for use in remote applications, such as the North Warning Project (NWP), the planned upgrade of the DEW line across Northern Canada. The NWP is currently planning to use diesel systems as the power supply, but if a reactor alternative can be satisfactorily demonstrated, it could provide significant potential advantages in overall life-cycle costs and logistics operations. The goal is to place a demonstration reactor on test by early FY 1987 and to have a prototype unit installed approximately a year later. Upgrades of this technology could also have significant potential in civilian applications in cold, remote regions of the far north.

The project is a joint effort between Atomic Energy of Canada Limited and DOE with support from both the Canadian Department of National Defense and the USAF. Development costs are being shared by the four organizations with the overall U.S. and Canadian contributions to be roughly equal. Within the U.S. share, the USAF provided $1,500,000 in FY 1985 and is expected to provide another $1,500,000 in FY 1986 and $1,000,000 in FY 1987.

In FY 1985, a reactor conceptual design and cost trade-off studies were completed that indicated the nuclear reactor concept was highly competitive with diesel generators. A decision was made to proceed with the development of a demonstration reactor, and funds were reprogrammed in FY 1985 from other Nuclear Energy programs to continue this effort. Also in FY 1985, the reactor design was initiated, and long-lead procurement orders were placed. In FY 1986, the design is being completed, component development testing is underway, and the demonstration reactor is being fabricated.

In FY 1987, all components for the demonstration reactor will be fabricated, including the particle fuel, graphite core, heat pipes, reflector, control rods and drive mechanisms, and the Organic Rankine cycle power conversion system. Zero power tests will be conducted at the Los Alamos National Laboratory (LANL) on the core-fuel-reflector-control rod-heat pipe subassembly to verify the neutronics performance. This subassembly will be transported to the Whiteshell Nuclear Research Establishment in Canada and integrated with the power conversion system. The assembled reactor will be installed in a test cell at Whiteshell, and after checkout, a series of system startup tests will be initiated in early FY 1988.

(Capital equipment):

Funding is requested to cover purchase of reactor control computer, peripherals, and reactor instrumentation.

Dynamic Isotope Power System (DIPS) (Operating expenses):

The DIPS is being developed under joint DOD and DOE sponsorship with cost-sharing to meet power requirements in the 1-10-kWe range for military spacecraft. DIPS may well be the only viable power source in this range for spacecraft that requires survival and maneuvering capabilities. Therefore, without this power source, certain space missions will not be feasible.

Based upon studies by four DOD contractors, DIPS may be the enabling technology required for the Boost Surveillance and Tracking System (BSTS) and the Space Surveillance and Tracking System, which have planned launch dates in the early 1990's as part of the SDI. These space surveillance satellites will require (1) large amounts of power (1 to 10 kilowatts), (2) compact size, and (3) survivability against threats, such as nuclear and laser attacks. DIPS will provide the necessary high power and compact size to enable these spacecraft to perform their missions.

To provide such a reliable high power source, the Department is pursuing, in cooperation with DOD, the technology development of a turbine-alternator conversion system. This dynamic conversion system, when coupled with a radioisotope heat source, offers the potential of high power levels at high efficiencies. Under DIPS, design and technology studies will be carried out focusing on the military's requirements. To meet the criteria of high reliability and long life will require a high degree of quality engineering and quality control within the development program.

Planned efforts for DIPS in FY 1987, which is being initiated in FY 1986 with USAF funding, are to complete the conceptual design studies and survivability analyses for the two dynamic conversion conceptual approaches, i.e., Organic Rankine and Brayton cycles. Also in FY 1987, component development and testing will begin on critical subsystem assemblies. Power subsystem design and spacecraft preliminary interface requirements will be defined for the potential SDI missions. Selection of the DIPS conversion cycle will be made. Preliminary designs for the engineering unit will be initiated, and life testing of the critical components of the selected conversion cycle will be continued. Safety and operational analyses will be initiated. The FY 1987 funding request is generally consistent with the current interagency understanding on a cost-sharing arrangement between DOE and DOD/USAF. The funding is also consistent with the FY 1986 Congressional guidance that the Department pursue research and development activities associated with a nuclear isotope dynamic conversion power system.

(Capital equipment):

Ground demonstration unit equipment for both the Organic Rankine and Brayton Systems will be procured and installed in order to make a conversion system selection.

Multimegawatt (MMW) Power Systems

The MMW Power Systems efforts are directed toward the development of nuclear power systems in the megawatts to hundreds of megawatts power range. These efforts include the development of high performance reactor concepts and technologies to meet the SDI's continuous (several megawatts) and burst (hundreds of megawatts) space power requirements; the design, fabrication, and construction of a minimally attended 10-MWe terrestrial reactor to provide secure power for military logistic centers and USAF installations; and studies of related high performance terrestrial reactor systems to meet SDI power requirements.

MMW Space Power System (Operating expenses):

The MMW Space Power System element is the nuclear component of the joint DOE and SDIO program to develop large power sources, both nuclear and nonnuclear, for space applications. The goal is to identify and develop high performance reactor concepts and technologies that meet SDI space prime power requirements and to select at least one concept for engineering development and ground testing starting in early FY 1992. This concept may also satisfy future NASA civilian missions requirements for megawatts of electrical power.

The SDI initiative proposed by the President is dependent upon having a viable energy source to power the defensive Directed and Kinetic Energy weapons and to operate the overall integrated system, including tracking, surveillance, and communications. The power needs vary from a few megawatts of steady-state power for the system operation functions to hundreds of megawatts of burst power for the weapons systems.

In making decisions on which MMW systems will meet SDI needs, the total integrated energy requirement (power level multiplied by duration) may be of more significance than the power level itself. These power and integrated energy levels are orders of magnitude greater than can be met by current SP-100 or similar technologies without excessive weight, volume, and cost. These increases will be accomplished, to a large extent, by increasing the system operating temperature and reactor power density and by simultaneously developing advanced, highly efficient, light weight conversion and heat rejection systems that are up to orders-of-magnitude lower in specific weight (kilograms per kilowatt) as compared to SP-100. Therefore, advanced space power, such as the MMW system, must be developed as an enabling technology for the success of the SDI.

In cooperation with the SDIO, DOE has embarked on a jointly funded program to develop space reactor technology in the MMW regime. SDIO provides funding to DOE to assess various reactor power system concepts and to develop the nonreactor technology portions of the overall reactor power systems. DOE funding will provide for the R&D of the nuclear reactor and directly related nuclear technologies.

During FY 1985 and FY 1986, using SDIO funds, the focus has been placed on assessing and investigating various system concepts and related critical technology areas that must be advanced if these reactor system concepts are to be able to meet the power, mass, volume, and longevity requirements of the SDIO. Simultaneously, SDIO will be carrying out similar analyses on nonnuclear concepts. Out of this process, a total of perhaps five or six candidate concepts (including three or four nuclear concepts) will be selected for further development.

The FY 1987 effort will continue the evaluation and development of potential concepts primarily using SDIO funds. The DOE funds will allow the experimental testing and development of key enabling technologies that are required if the preferred concepts are to become fully viable. These experimental testing and development efforts will focus on advanced nuclear fuels, materials, safety, and reliability. Advanced reactor control techniques and neutronics, shielding, and thermal hydraulic codes will also be developed.

Higher reactor operating temperatures and higher heat rejection temperatures can significantly lower overall MMW power system mass and size. However, increasing the reactor temperature imposes stringent demands on reactor fuels and materials. The requirement for advances in fuel technology is the result of a need to operate the reactor at a much higher power density, higher burnups, increased longevity, and at unusually high thermal stress conditions over the fuels of today's technology. For these reasons, extensive testing both in-reactor and out-of-reactor must be performed. Lead times of a minimum of 1 to 2 years are needed to develop the fuel and cladding material to the required specifications, and at least 1 year of irradiation is needed to obtain useful information on fuel performance. Therefore, it is imperative that a significant effort be devoted to fuels and materials in FY 1987 to meet the concept downselection milestones as well as the final 1991 concept selection milestone.

To provide the low mass, high-temperature materials that are compatible with liquid metal and/or gas coolants, the MMW effort must include the evaluation of a full range of alloys, high temperature advanced composite materials, and structural ceramics and coatings. Coincident with this effort will be the evaluation of alternative materials to be used as radiation shielding. As a significant fraction of the power system weight, shielding material, such as tungsten, lithium hydride, or borated beryllium oxide, must be evaluated in terms of coolant compatibility and weight-optimized design.

Candidate fuels such as cermets, stabilized uranium nitrides, thermionic, aerosol, and coated-particle fuels will be analyzed as to their respective capabilities to withstand the order-of-magnitude increase in required performance. In addition to fuels and materials, calculational methods on advanced neutronics and safety, physics, thermal hydraulics, and core design will be developed as early as possible to adequately evaluate and reduce the number of proposed concepts. This will allow the maximum use of resources and time to be devoted to the most promising concepts. If the fuels and materials and other technology development efforts are not adequately addressed in FY 1987, the result could be an extension of the program beyond 1991, thereby jeopardizing DOE's ability to provide SDI with a proven concept for engineering development and ground testing on schedule.

A thermionic fuel element verification program will also be conducted to address the key technical issues raised in the SP-100 concept selection process, reoriented to the MMW regime. MMW class thermionic fuel elements, components, and materials will be fabricated and tested out-of-core as well as in-core. This includes advanced thermionic fuel, ceramic sheath insulators, cesium-graphite reservoirs, and insulator seals.

The surety requirements for the MMW concepts will be thoroughly analyzed to ensure that operation of the power system will be highly reliable and causes no adverse effects on other components involved with the mission, the operating personnel, the health and safety of the public, or the quality of the earth's environment. This aspect must be considered at the earliest possible time and will require the identification of an initial set of surety design issues from which preliminary concept guidelines can be based.

(Capital equipment):

Capital equipment funding will be used for the acquisition of instrumentation and equipment to support proceeding with the MMW space reactor technology development efforts. This includes items such as: instrumentation required for in-reactor and out-of-reactor testing of advanced space reactor materials and components, fuels fabrication and processing equipment, high vacuum chambers, vacuum furnaces, helical induction pumps, compressors, furnaces, and valving.

Multimegawatt Terrestrial Powerplant (MTP) Project (Operating expenses):

The second major effort is the continuation of studies and designs leading to possible construction of nuclear powerplants to satisfy a requirement for secure and reliable power to ground-based components of the SDI and to other military installations. For these applications, uninterrupted availability of electrical power is critical to the performance of specific missions. Such power systems, because of their modularity, could also be used in the civilian/commercial sector.

The SDIO has expressed interest in a nuclear powerplant for its ground-based assets. These assets include the command, control, and communications systems that must operate reliably in a hostile environment if the total SDI system is to be credible. Also included are electromagnetic guns for terminal defense, surface to space directed energy weapons, radars, and facilities for placing surveillance satellites into special orbits. The source of power for these assets must be relatively invulnerable to terrorism, sabotage, and electromagnetic pulses from high altitude nuclear detonations as well as to acts of nature, such as lightning strikes, snow, windstorms, etc. As the SDI system emerges, it is possible that a significant portion of the detection and weapon systems will be ground-based rather than space-based; these assets will need power supplied from a dedicated, secure, and reliable powerplant.

Conceptual designs for a nominal 10-MWe nuclear powerplant capable of providing a secure, hardened energy supply at military installations have been prepared and were found to meet DOD requirements. All were judged to be well within the capability of U.S. industry to develop and produce. The technical, cost, and schedules risks were judged to be minimal, and in FY 1986, up to two designs are being selected for detailed design work. It is planned to select one design for fabrication and construction when the detailed design is completed. The designs include features that enhance passive safety, permit small sized operating crews, offer capacity factors of greater than 90 percent, and make the plant relatively invulnerable to certain specified military threats. The plant will be largely factory fabricated, thus minimizing costly field fabrication and erection.

The funds requested in FY 1987 will complement funds provided by DOD and will support preliminary design work (Title I - Engineering Services) on the concepts being selected in FY 1986, along with any studies deemed necessary on larger plant designs or advanced reactors. Specific activities to be conducted include the completion of topographical and site surveys for a 10-MWe plant, development of a work breakdown structure and project schedule, the preparation of a preliminary cost estimate, and the preparation of a Preliminary Safety Analysis Report. Based on the results of this work and follow on detailed design work (Title II - Engineering Services) to be accomplished in FY 1988, it will be possible to select a concept for construction on a schedule to meet SDI and other requirements.

	FY 1986 Approp.	FY 1987 Request
Advanced Nuclear Systems		
Operating expenses..........................	$ 17,854	$ 20,600
Capital equipment...........................	1,636	3,000
Total.....................................	$ 19,490	$ 23,600

The Advanced Nuclear Systems activity is charged with the responsibility for the development, demonstration, and delivery of radioisotope power sources for U.S. military and civilian space and terrestrial missions, and for the assessment and maintenance of these energy sources consistent with the Department's health and safety, safeguards, and security requirements. The FY 1987 requested funding level is an increase of $4,110,000 from the FY 1986 appropriation. This increase is primarily a result of existing or planned military requests for the DOE to develop the isotope power system technology to support national defense and security programs of the United States.

The Advanced Nuclear Systems activity is comprised of two major elements: (1) Radioisotope Thermoelectric Generators (RTG's) and (2) Special Applications. The goals of this activity are to support civilian and military specialized applications through the development of a range of isotope power system options and to assemble, test, and deliver these isotope power systems for approved mission applications. The activity is oriented to meet the specific product requirements of user agencies. This product orientation is accomplished through support for isotope power system development and isotope power system production as requested by the these agencies. In order to meet requests from user agencies, the Department conducts a balanced, goal-oriented R&D program and maintains the necessary isotope power produrtion facilities in a state of readiness. The Department also provides for the important safety, reliability, and quality assurance functions that enable it to discharge its statutory responsibilities.

The RTG efforts provide the system design, integration, and converter fabrication for U.S. space missions and provides the facilities and technology to build and test the various isotope power systems for Federal user agencies. This activity includes the required technical, safety, safeguards, and security support for the nuclear activities. The Special Applications element includes the advanced R&D for terrestrial isotope power supplies requested by the military. The two elements are closely connected. Under RTG, the systems contractor will design the isotope power supply to meet the specific space mission requirements and will fabricate the conversion systems. The DOE laboratories will fabricate the isotope heat source for the isotope power supply and perform the final assembly and testing. The supporting safety and technology work is concurrently carried out under this element. The RTG element also provides the RTG and heat source assembly and safety support to the Special Applications activity. A similar arrangement exists between the DIPS and RTG elements for isotope-powered dynamic conversion systems.

A major effort under RTG has been the design and fabrication of the isotope power supplies and planning of launch support activities for the NASA Galileo and Ulysses spacecraft, which are scheduled for launch aboard space shuttles in 1986. These isotope power supplies include 4 flight RTG's and 110 radioisotope heater units to provide thermal energy to various systems. These two important national and international space missions would not be possible without isotope power systems.

Following the 1986 launches of the Galileo and Ulysses spacecraft, the Department will analyze the performance of the General Purpose Heat Source (GPHS) RTG's on these two spacecraft and provide power predictions to enable NASA to successfully carry out these missions. In parallel, the qualification and engineering units will be kept on test at the Mound Plant to determine the long-term performance of the GPHS-RTG design.

With the completion of the GPHS-RTG's for the Galileo and Ulysses missions, it is essential that continued improvements be made in the design margin of the GPHS for future shuttle-launched spacecraft. This design improvement work will involve extensive interactions among the several safety organizations to address the various safety and design criteria within the overall power system constraints. This design improvement will build upon the extensive safety tests and analyses carried out in FY 1985 and FY 1986 in support of the Galileo and Ulysses launches.

In preparation for future NASA and DOD space missions, the Department is also pursuing an advanced RTG design that offers higher power per pound and greater versatility. This program, known as the Modular Isotope Thermoelectric Generator (MITG), will enable NASA to accommodate a range of interplanetary missions identified by the Solar System Exploration Committee of the NASA Advisory Council. The MITG is also a candidate power source for the flight experiment of the [illegible] for the SDI program.

In support of the Special Applications element, the Mound Plant will develop the facilities, tooling, and procedural capability to fuel, assemble, and test terrestrial RTG's for national security applications that are expected to be in the power range from a few watts to 100 watts (electrical). A current requirement exists to deliver a 100-watt RTG in late 1988. Also, the Mound Plant and LANL will begin development of a heat source for a new class of low wattage RTG's for national defense missions. The fuel for these RTG's will come from the Savannah River Plant, and the actual nuclear heat source assembly for these low wattage RTG's will be carried out at LANL.

ORNL will provide the materials technology support for the new space and terrestrial RTG's by characterizing and/or improving RTG heat source materials. The Savannah River Plant will continue in a production-readiness mode for the fuel form production and encapsulation activities that are now scheduled to begin in FY 1988 in support of future space missions. All of the heat source laboratories will provide design and fabrication support to the DIPS program.

Radioisotope Thermoelectric Generators (RTG's) (Operating expenses)

Efforts within this element are directed at providing the flight RTG designs, system integration, and flight converter fabrication, as well as advanced RTG designs, for space missions. Other efforts include the nuclear facility operations, safety testing, analysis, work and the required independent technical, safety, reliability, and quality assurance support to enable the Department to meet its statutory responsibilities. Also included are all of the system design, system safety, and flight converters for the planned 1986 launches of the Galileo and Ulysses spacecraft and the continuing flight support efforts of life testing, power predictions, and performance analyses. Also, efforts related to the development of the advanced RTG's are conducted to meet the requirements of planned civilian and military missions.

In FY 1986, flight acceptance testing of all flight units and the submittal of all software items are being completed. Government acceptance of all four flight GPHS-RTG's for the Galileo and Ulysses missions is also being completed, and the RTG's are being shipped to the Kennedy Space Center (KSC). The spare flight GPHS-RTG will be retained by the Mound Plant for protective storage. In parallel and in support of the flight systems development activities, the Mound Plant is continuing the life testing of the qualification and engineering units of the GPHS-RTG. This testing will continue in FY 1987 to enable making the required performance predictions for the NASA Galileo and Ulysses RTG's during their mission lifetime of several years. Also, the Final Safety Analysis Report (FSAR) [illegible] are being issued. Launch support interface activities with NASA's Jet Propulsion Laboratory and KSC are being increased to support launches of the Galileo and Ulysses spacecraft. The fabrication of the MITG ground demonstration unit is being completed, and testing is being started.

In FY 1987, the final technical report for the GPHS-RTG effort will be issued and post-launch data reduction and performance analyses of the flight generators will be accomplished. Also, all spare space hardware will be refurbished, protectively packaged, and stored. Analyses of all component life test data, including the ongoing flight units data, will be continued to update the mission prediction data requirements. Completion of the MITG development program is required to meet planned civilian and certain potential military missions. In particular, NASA plans to develop a new scientific spacecraft called the Mariner Mark II, which will be designed to accommodate such missions as the Comet Rendezvous Asteroid Flyby, the Saturn Orbiter/Titan Probe, and the Mars Rover Sample Return. The MITG is an enabling technology for these missions, which are too far from the sun to use solar panels. The MITG development program through ground engineering unit is planned to be completed in order to start the flight system program in FY 1988.

To meet space mission goals of greater power with lower weight, efforts are under way to improve thermoelectric materials for future missions through: (1) limited R&D on the statistical screening of silicon germanium thermoelectric materials, (2) the independent evaluation of the thermoelectric materials properties, and (3) evaluation of degradation mechanisms and material interactions.

In the terrestrial RTG area, support is provided to the Special Applications program, particularly through the heat source design and fabrication facilities at the SRP laboratories. A range of RTG's have been used and are planned to be used in the military for special applications. It is expected that the [illegible] RTG's delivered since early 1977 will continue to be used for some years, but some replacements will be required because of age. The [illegible] RTG use continues to use the [illegible] heat source fuel until the supply is exhausted, after which it can use the GPHS fuel technology that was developed for the NASA space missions. However, the new terrestrial RTG's that are expected in the future requirement will require a new heat source design to meet the objectives of RTG compactness and a very long lifetime in a severe operating environment.

Because of the importance of these military RTG's and military requirements, a major effort is planned to support their development and delivery. The Mound Plant will assume the responsibility to assemble and test these terrestrial RTG's as it has for the space RTG's. Thus, in FY 1987, Mound will start the facility modifications for assembly and testing of the military RTG units planned for delivery in 1988. The Mound Plant, LANL, ORNL, and the Savannah River Plant will provide heat source manufacturing and design support to the military terrestrial power system design through cooperative work under the Special Applications program and the RTG effort.

In order to meet the requirements of these compact, low-wattage RTG's, it is necessary to begin heat source design and the long-lead procurement and fabrication of heat source components in FY 1987. As the lead heat source laboratory and RTG assembly/testing organization, the Mound Plant will oversee the necessary hardware work while LANL carries out the safety testing required to support the Ground Safety Analysis Report and packaging requirements.

The flight-related reviews of the GPHS have shown a need to continue the efforts to improve the design margin for future space shuttle flights. The improvement program will involve LANL, the Applied Physics Laboratory, and other safety and design organizations, plus ORNL and Mound in a focused effort to further enhance the performance of the GPHS.

During the production campaign for the Galileo and Ulysses missions, several areas were identified in which production improvements could be made that would enhance the Department's production capabilities while reducing the number of rejections of heat source components and hence the unit costs. A key element of this is the heat source materials program at ORNL where improved processes and forming techniques promise improved yields at lower unit costs of: (1) the iridium alloy that is used to encapsulate the fuel pellets for military and civilian RTG's and DIPS and (2) the carbon sleeves that provide thermal insulation for the heat sources inside the RTG's and DIPS. During FY 1987, ORNL will demonstrate production improvements of the iridium and carbon components. Fabrication support to DIPS will be provided. ORNL will also provide the nondestructive examination technology to support upcoming flight systems, such as the MITG.

Under the RTG element, the Department's isotope power system nuclear facilities will be maintained. In addition to the Mound Plant and ORNL activities discussed in the previous paragraphs, the Savannah River Plant's Plutonium Fuel Form Facility will be maintained in a production readiness status during FY 1987. Production maintenance activities will be performed, including tests of safety-related systems and the exercising of key process equipment on a monthly, weekly, and daily basis. Selective preventive maintenance will be conducted to prevent degradation of key process equipment and to ensure availability of critical spares/replacement parts, especially long-lead items necessary to permit ready start-up of the plutonium-238 fuel pellet production/encapsulation early in FY 1988. Technical support will also be provided for the coordination of fuel form production planning with other Government laboratories and systems contractors.

Because of the unique operating environments of RTG's, it is necessary that the reliability and quality of the product be assured. Therefore, independent reliability and quality assurance support to the terrestrial RTG effort and independent quality control for refurbishment and respacing of [illegible] Mod-2 RTG's will be provided. Also, operation analysis of facilities using plutonium-238 fuel will be conducted to fulfill safety requirements, including risk assessment review of assembly and testing operations.

Technical support to the isotope power system effort in the areas of independent analysis, component testing, conceptual design evaluations, and application studies for terrestrial and space isotope power systems will be continued. Isotope power system survivability studies will be supported, and system analyses in support of design work on a heat source design with improved margins will be carried out.

In keeping with the plans to pursue the technology development of advanced conversion materials, the improved thermoelectric materials effort will be continued. Optimum silicon germanium (SiGe) composition (Si/Ge ratio, alloy addition, and dopant level) and processing parameters for both negative and positive type SiGe thermoelectrics exhibiting a 25 percent improvement in performance over standard GPHS-RTG SiGe materials will be pursued.

Independent safety reviews of proposed low-wattage, terrestrial RTG designs will be conducted, and tests and evaluations to support safety reviews of these and other planned isotope power systems will be pursued. As part of the independent safety effort, fuel behavior experiments in several media environments will be conducted in support of safety analysis reports and independent risk assessments of military isotope power system designs. It is planned to update risk models using experience developed in the Galileo/Ulysses flight programs and to provide risk assessments of improved heat source designs for planned future missions, including independent thermal analysis for the terrestrial RTG designs. Also, an aerothermal analysis handbook will be prepared for use by isotope power system designers.

Aerothermal analyses will be conducted on proposed heat source designs to improve the margin of safety.

(Capital equipment):

In FY 1987, a variety of essential capital equipment is required to support the ongoing facility and engineering development activities. The Mound Plant plans to design a new small, low-wattage RTG glovebox line required to support the DOD RTG as part of the effort to modify the assembly and testing facilities to accommodate the smaller terrestrial RTG's. Equipment required to prepare the F-line system for assembly of the DOD HPG Mod-3 RTG planned for assembly and delivery in FY 1989 will be produced. Miscellaneous process and test equipment needed to maintain heat sources and RTG assembly and test facilities in a state-of-readiness for future civilian and military programs will be obtained, e.g., replacement fixtures, recorders, pumps, amplifiers, gauges, electrical measuring equipment, analyzers, heater elements, manipulators, circuit boards, accelerometers, strain gauges, etc., required to maintain system operating conditions.

Savannah River Plant will complete and check out a new Metallographic Facility required in support of plutonium-238 fuel form production/encapsulation activities scheduled to start in FY 1989. Miscellaneous items of capital equipment will be procured, such as cell windows, manipulators, and special tools required to support effective production maintenance and to ensure immediate plutonium-238 fuel form production startup in FY 1989. A high temperature vacuum furnace is to be procured to sustain iridium alloy production capability at ORNL. Fabrication and testing equipment will be purchased for the multicouple devices for the MITG program in FY 1987. Los Alamos will obtain special handling fixtures required to support the new low-power terrestrial RTG effort and test equipment for the safety improvement program.

Special Applications (Operating expenses):

In order to meet our obligation to deliver low-wattage RTG's for special terrestrial applications, the Department is continuing its efforts to develop and demonstrate the necessary technology. Missions that involve very long duration and unattended operations cannot be accomplished with conventional power supplies. During FY 1986, investigations are continuing into the thermoelectric module technology, and a primary candidate and alternate designs are undergoing environmental and performance tests. Modules of the selected thermoelectric technology are being assembled into multiple test fixtures, and a demonstration system for long-term performance testing is being assembled.

In FY 1987, the demonstration system will continue on long-term testing to verify performance predictions. Additional thermoelectric modules will be placed on test under predetermined conditions to support RTG performance predictions and reliability analyses. Also, the Department will continue its system studies and development of RTG design concepts to support projected terrestrial applications.

	FY 1986 Approp.	FY 1987 Request
Facilities		
Operating expenses..........................	$124,173	$115,200
Capital equipment...........................	4,503	2,800
Construction................................	3,560	3,800
Total.......................................	$132,236	$121,800

The availability of key test facilities is essential to meet the overall objectives of the Nuclear Energy Research and Development program. Facilities provide unique testing capabilities required for the development of safe, reliable, environmentally acceptable, and efficient nuclear power systems suitable for space, military, and civilian applications. Nuclear energy facilities conduct experiments for fusion technology; for cooperative technology programs with other countries; for developing nonnuclear energy resources, such as coal, solar, and geothermal; and for other private and Government organizations, such as the EPRI and the NRC programs.

In recent years, several facilities have been shut down, and steps have been taken to consolidate activities to reduce costs and to improve safeguards and security. At the Argonne National Laboratory (ANL) East site in Illinois, the Zero Power Reactors (facilities for reactor criticals) have been shut down, and the nuclear material has been transferred to the ANL-West site in Idaho. The Engineering Test Reactor, located at INEL, has been shut down, and the Thermal Hydraulic Out-of-Reactor facility at ORNL was shut down in FY 1985. Actions are proceeding in FY 1986 at the LANL to close out fuel examination hot cells and to consolidate requirements at other test sites. Several test facilities at the Energy Technology Engineering Center (ETEC) have been shut down or placed in standby, including the world's largest sodium pump test facilities. In FY 1985, proposals were solicited for a private sector funded cogeneration addition to ETEC. Plans call for this privately financed cogeneration addition to be leased to ETEC to sell electricity during steam generator testing. The sale of electricity will be used to offset costs of ETEC operations.

The Department maintains a continuous effort to improve the efficiency of its facilities so that the limited resources can be focused on priority national needs. As a result of these consolidations and cost reduction measures, the test facility efforts are presently focused at ETEC, ANL-West, and HEDL.

ETEC is the program's nonnuclear component testing center. Certain developmental hardware, software, and instrumentation can be tested in this nonnuclear environment with greater ease and flexibility than in a nuclear situation and at lower cost. During FY 1986, ETEC test operations include: key feature tests involving natural circulation and advanced shutdown heat removal systems for advanced plant concepts; start of performance testing of the helical coil steam generator model at limited power levels; and test activities that support efforts on plant design simplification that will provide major reductions in plant design, construction, and operating costs.

At ANL-West, the EBR-II, the Nation's only operating LMR powerplant, provides important information on the long-term reliability of LMR's. Despite the diversity and complexity of the experimental program, EBR-II operations have achieved an average plant capacity factor of 71 percent over the last 10 years providing reliable electric power to INEL. The EBR-II has unique testing capabilities, and tests being being conducted in FY 1986 include: the effects of running-beyond-cladding-breach; response of fuel to operational transients; and plant response to upset conditions. EBR-II also serves as an important test bed for innovative LMR design key features, such as flexible pipe joints, improved materials, and instrument and control system improvements. In FY 1986, full completion of the TREAT Upgrade project is being deferred to permit the conduct of defense program tests and a series of tests to substantiate the inherent safety characteristics of metal fuel for application in advanced reactors. The TREAT Upgrade project will be completed within existing appropriations consistent with the experimental program priorities. The Hot Fuel Examination Facility is an essential support facility for the EBR-II, TREAT, and the Fast Flux Test Facility (FFTF) at HEDL. The Zero Power Plutonium Reactor is the Nation's largest critical facility and is being utilized in a follow-on joint U.S./Japanese program to study the physics of heterogeneous cores.

The FFTF at HEDL is the most modern and powerful fuels and materials irradiation test reactor in the world. Since criticality in 1980, FFTF operations have achieved a world's record for LMR continuous operation at full power (101 days) and the burnup of fuel well beyond the goal burnup of 80,000 megawatt days per metric ton. During FY 1986, the following ongoing activities at FFTF are providing significant contributions to the development of nuclear technology important to the design of safe and reliable reactor systems: (1) demonstration of improved LMR inherent safety features provided by reactivity feedback effects; (2) demonstration of a longer life mixed oxide LMR fuel that will enable reductions in fuel fabrication, significant increases in reactor operating times, and a corresponding reduction in radiation exposure to personnel; and (3) testing of an advanced control concept that uses artificial intelligence for enhancing both the operations and maintenance functions of advanced reactors and has the potential for increasing operations/maintenance personnel productivity. In addition, the consolidation of plutonium handling activities to the 400 Area will be completed. Also, the Secure Automated Fabrication (SAF) line, which will produce fuel for the FFTF, is being completed in FY 1986. Presently, there are no commercial suppliers in the United States for mixed oxide fuel production. SAF line technology transfer to the private sector will be conducted to enable U.S. commercialization as market forces dictate.

The safeguards and program assurance efforts are integral to facility operations and include physical security systems and materials control and accountability at ANL and HEDL. This activity is essential to ensure an integrated safeguards system for Agency facilities within the nuclear energy sector that acquire, use, store, and dispose of special nuclear materials. Program assurance efforts include safety and quality assurance evaluations of nuclear energy facilities and programs.

In FY 1986, the primary emphasis of the facilities testing activity is being directed to support the civilian reactor development program. However, substantial support is also being provided to other programs, including space, defense, fusion, NRC, and others. The professional expertise and facility testing capabilities at the principal nuclear energy sites provide these programs with essential technical resources. Activities being performed for these other programs include: (1) irradiation of candidate materials in the FFTF for the United States and Japan's fusion programs; (2) irradiation of SP-100 reactor candidate fuels and materials in the EBR-II; (3) technical feasibility and proof-of-principal testing in the TREAT for a national defense effort; (4) performance testing of LWR pressure isolation valves in ETEC for NRC; and (5) design and trade-off studies by ETEC in support of space propulsion system development at the Lawrence Livermore National Laboratory. Facilities utilization by other programs is projected to markedly increase as a result of the technical capabilities of these facilities and the emerging requirements for nuclear powerplants in a wide range of power sizes to meet a broad spectrum of space, defense, and civilian requirements.

A cost-sharing approach for key facilities will be established that will more equitably distribute costs among users and provide an integrated DOE approach for optimum facility utilization. This cost-sharing approach will be implemented, to the degree practicable in FY 1987, with full implementation planned for FY 1988 and beyond. Proper allocation of facility costs to users, including private industry, foreign countries, NRC, DOD, and other DOE programs, will permit essential technology programs to be conducted at reduced programmatic funding levels.

In FY 1987, the facilities and testing activity will be directed to the changing civilian, military, and space nuclear power requirements. Civilian advanced converter concepts will require special tests for evaluation of fuels performance and reactor dynamics. Irradiation testing is assuming a more critical position in analysis of materials and fuel performance for military and space reactor applications. The efforts planned for FY 1987 in support of the civilian, space, and defense needs include reactor safety, fuel performance, and component testing for advanced reactor concepts, irradiation of candidate core materials for space reactor use, proof of principal and feasibility transient testing for an advanced defense system, irradiation of SP-100 fuel and cladding, cold checkout of the SAF line, run-beyond-cladding breach and operational transient testing under the joint U.S./Japan cooperative program, transient testing for the U.S./United Kingdom exchange agreement, irradiation of material specimens for the U.S. and Japan's fusion programs, and tests supporting reactor plant simplification and cost reduction features. Facilities support of international agreements, other DOE programs, and non-DOE programs will be on a cost-sharing basis.

(Capital equipment):

The requested funding will provide for the procurement of special test and hardware and equipment, such as thermocouples, pressure transducers, and other special hardware to conduct experiments at facilities.

(Construction):

The requested funding provides for completion of the ANL-West physical security upgrade project (85-N-602), for general plant projects at HEDL and ETEC, and for reactor modifications at ANL and HEDL that improve efficiency and reliability in the conduct of test programs. Additional information is provided in the attached construction project data sheets.

	FY 1986 Approp.	FY 1987 Request
Water Cooled Breeder		
Operating expenses........................	$ 18,955	$ 13,800
Total....................................	$ 18,955	$ 13,800

The Water Cooled Breeder FY 1987 funding level of $13,800,000 is a planned decrease of $5,155,000 from the FY 1986 appropriation.

The Water Cooled Breeder activity is developing a self-sustaining breeder nuclear reactor that is cooled and moderated with ordinary (light) water and fueled with uranium-233 and thorium. If proven, the concept would make thorium, which has plentiful reserves, available for industry use as a source of energy.

The principal objectives of this activity are to: prove that breeding can be achieved in a light water nuclear powerplant using a thorium/uranium-233 fuel system; confirm a practical way to use thorium, a plentiful source of fuel for which there has been no major energy-related use; show the feasibility of installing cores of the light water breeder type in pressurized water reactor plants using existing types of plant components and systems; and make the technology developed under the program available to the commercial industry.

A light water breeder core was installed in the Shippingport Atomic Power Station reactor in 1977. During the next 5 years, the light water breeder core accumulated nearly 29,000 effective full power hours while supplying electric power to the Duquesne Light Company distribution system. Throughout this period, the core performed successfully in both the sustained high power operation and periodic swing load operation.

In late 1982, the Shippingport reactor was shut down and under went end-of-life testing and defueling. The shipment of spent fuel to the Naval Reactors Expended Core Facility in Idaho was completed in late 1984. Core evaluation is underway at the Expended Core Facility to verify core performance, including breeding characteristics.

The Water Cooled Breeder activity will be completed in FY 1987, bringing to fruition over 20 years work in validating a major investment. Successful confirmation of breeding will provide the basic technology for potentially meeting this country's electric power requirements for hundreds of years.

The efforts to be conducted and funding levels within the Water Cooled Breeder activity in FY 1987 are: (1) Defueling activities ($3,600,000) and (2) Core evaluation ($10,200,000).

Defueling Activities (Operating expenses):

Defueling activities consist of preparation and shipment of fuel for long-term storage, cleaning up facilities, and technical documentation.

Defueling activities in FY 1987 will include: drying and sealing remaining spent fuel assemblies and individual fuel rods in storage containers; loading casks and shipping them to the Idaho Chemical Processing Plant for long-term storage; cleaning up light water breeder reactor manufacturing facilities; and publishing final reports on reactor operation, end-of-core-life test results, and defueling.

Core Evaluation (Operating expenses):

The core evaluation effort is essential to determining the success of the light water breeder reactor core. Detailed evaluation of spent fuel assemblies at the Expended Core Facility will verify core performance and breeding characteristics.

Core evaluation work in FY 1987 will include: completing nondestructive assay of about 500 fuel rods to confirm breeding; completing documentation of the technology for use by industry; and completing core and structural materials examinations to determine the performance of the light water breeder reactor. The examinations include measurements of fuel assembly bow, rod support grid wear and spring force, fuel rod spacing, clad corrosion, characterization of fission gas release from fuel, and fuel pellet condition. These examinations will help assess whether the thorium/uranium-233 fuel system is a practical energy source.

	FY 1986 Approp.	FY 1987 Request
Program Direction		
Operating expenses..........................	$ 8,080	$ 9,550
Total....................................	$ 8,080	$ 9,550

The requested funding provides for 119 full-time employees (FTE's) in FY 1987 In FY 1985 and FY 1986, prior year carryover funds were available to supplement this account allowing for reduced congressional requests in those years. The FY 1987 funding increase is necessary to cover the total cost of this activity in the budget year.

The Federal personnel are required in order to perform a broad array of functions at Headquarters and in the field in the conduct of research and development activities involving other Federal agencies, the nuclear industrial and utility communities, and foreign governments. This line item does not include estimates for Federal personnel costs and positions for Wate Cooled Breeder activities that are inseparable from those included in the Naval Reactors development program.

Some of the major activities associated with the management of the Nuclear Energy R&D program include the following:

- o Performing long- and short-term program planning; establishing technical objectives, work scope, and resource levels; establishing procedures and publishing guidance; and integrating multiple field installations and contractor activities into a cohesive effort.
- o Performing management functions, including assessing technical progress, interfacing work related work scope, resolving problems that prevent milestone achievement, ensuring safety, maintaining cost and schedule per established baselines, etc.
- o Interacting with the nuclear industrial/utility community and with other Federal agencies, state, and local governments; and responding to numerous public and Congressional inquiries.
- o Performing all administrative aspects, such as procurement, budgeting, preparing financial plans, participating in Congressional hearings, etc.

- Supporting international collaboration efforts at overseas and field locations.

Funding of $9,550,000 will be allocated as follows: $8,716,000 for personnel compensation and benefits, $500,000 for travel, and $334,000 for contractual services.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
NUCLEAR ENERGY - PLANT AND CAPITAL EQUIPMENT
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES
NUCLEAR ENERGY RESEARCH AND DEVELOPMENT
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: SP-100 Ground Engineering System (GES) Test Facility Modification
Bldg. 309, Hanford Engineering Dev. Lab.

2. Project No.: 86-N-105

3. Date A-E work initiated: FY 1986

3a. Date physical construction starts: 3rd or 4th Qtr FY 1986

4. Date construction ends: 1st Qtr FY 1989

5. Previous cost estimate: $16,000
Date: January 1985

6. Current cost estimate*: $22,724
Less amount for PE&D: 0
Net cost estimate: $22,724
Date: December 1985

7. Financial schedule*:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1986	$ 1,924	$ 1,924	$ 1,924	$ 1,924
1987	5,000	5,000	5,000	5,000
1988	14,800	14,800	14,800	14,800
1989	1,000	1,000	1,000	1,000
1990	0	0	0	0

*This cost estimate is preliminary and will be revised when the facility cost at the selected site is approved. In November 1985 the Hanford Engineering Development Laboratory was selected and work was started to define the conceptual design for the facility modifications. Approval of facility costs is expected by mid-FY 1986.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: SP-100 Ground Engineering System (GES) Test Facility Modification
Bldg. 309, Hanford Engineering Dev. Lab.

2. Project No.: 86-N-105

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8. Brief Physical Description of Project:

The project consists of modifying Bldg. 309 at the Hanford Engineering Development Laboratory beginning in FY 1986 and ending in FY 1989 in preparation for the SP-100 Ground Engineering System test scheduled to begin in FY 1990.

9. Purpose, Justification of Need for and Scope of Project:

In 1983, the Department of Energy (DOE), the National Aeronautics and Space Administration (NASA), and the Defense Advanced Research Projects Agency (DARPA) entered into an agreement to jointly develop and fund space nuclear reactor power system technology. Since that time the Strategic Defense Initiative Organization (SDIO) has replaced DARPA as the DOD participant. The goal of this triagency program is to develop safe, compact, light weight, durable (7 years at full power), high power multi-hundred kilowatt electric (approximately 20-1000 kWe) class space reactor power system technology to enable a broad class of emerging military and civil space missions in the early to mid-1990's and beyond. DOE has primary responsibility for developing and ground testing the nuclear subsystem.

The ground test phase is planned to continue until FY 1991 at a total cost of $450,600,000, of which DOE's share is approximately one-half. A $500,000,000 flight option is also identified and included as part of the SP-100 GES effort, as an option, but this option will only be exercised if and when a firm mission commitment to SP-100 technology is made and approval is obtained from the DOE Acquisition Executive. The objective of the SP-100 GES effort is to develop and demonstrate SP-100 technology flight readiness for dedicated use in the early to mid-1990's and beyond. In this regard, ground demonstration testing is required and will involve the development of a manufacturing base and component subsystem and system performance, safety, and engineering data sufficient to support a flight application program. Therefore, a dedicated facility will be required to support this effort.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: SP-100 Ground Engineering System (GES) Test Facility Modification [illegible] [illegible] Engineering Dev. Lab. 2. Project No.: [illegible]

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10. Details of Cost Estimate:

The selection of a preferred site was not made until early November 1986. Therefore, detailed cost estimates are not yet available and will be dependent upon the facility design to be utilized at the new site.

11. Methods of Performance:

Modification to existing DOE facilities will begin with preliminary design of required modifications, to be followed by detailed design and actual accomplishment of the facility modifications.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

To be determined when the conceptual design for facility modification is agreed upon.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

To be determined when the conceptual design for facility modifications is agreed upon and the system development contractor estimates are [illegible] [illegible].

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
NUCLEAR ENERGY - PLANT AND CAPITAL EQUIPMENT
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
NUCLEAR ENERGY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: General plant projects

2. Project No.: 87-N-102

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3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 3rd Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: None
Date:

6. Current cost estimate: $ 2,200
Less amount for PE&D: 0
Net cost estimate: $ 2,200
Date: December 1985

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7. Financial schedule:

Fiscal Year	Obligations	Costs FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	After
1982	$ 7,468	$ 4,163	$ 1,387	$ 380	$ 246	$ -	$ -
1983	3,000	187	1,679	737	397	-	-
1984	4,000		486	1,787	1,335	392	-
1985	5,700			1,252	2,995	1,100	353
1986	1,732				360	670	702
1987	2,200					560	1,640

8. Brief physical description of project:

These small construction projects provide for the many alterations, additions, modifications, rehabilitations and replacements required annually at the Energy Technology Engineering Center (ETEC) and the Hanford Engineering Development Laboratory (HEDL) to maintain the facilities and sites in a condition suitable to support space, defense, and civilian nuclear power activities. In essence, projects will provide for efficiency of operations, improvement in test capabilities, and improvements in health, safety, and fire protection conditions. The request also includes the costs of installed capital equipment integral to the subproject.

1. Title and location of project: General plant projects 2. Project No.: 87-N-102

9. Purpose, justification of need for, and scope of project:

Work under general plant projects (GPP) is essential to protect and upgrade the government's investment by preventing excessive deterioration and obsolescence. Support of this type is necessary to meet new and continuing needs of research and development programs, and to provide for a proper health and safety environment. The projects include modifications or improvements to existing buildings and facilities for continuing needs of research and development programs supporting space, defense and civilian nuclear power applications, and to provide for safe and economical operations. The projects include modifications or improvements to existing buildings and other facilities; building additions to house machinery, equipment and personnel; construction of small buildings; replacement or additions to roads and utility lines; and general area improvements. Two examples of the highest priority projects are identified below.

ETEC

Rehabilitation of Facilities and Access Areas. Some of the facilities, buildings, and related utility equipment has been in service for time periods exceeding the normal life of the item, resulting in high maintenance costs and reduced reliability. Access areas have been subject to heavy service and to erosion due to abnormal weather conditions. Activities will be performed site-wide to reduce the backlog of degraded conditions. Activities include safety and fire protection items such as replacement of PCB-filled electrical transformers, rehabilitation of building weatherproofing, facility improvements in support of space, defense, and civilian test program requirements, replacement of site and building utility components, and paving restoration and erosion control as part of the real property maintenance program.

HEDL

Real Property Maintenance. Sites and existing facilities must continue to be maintained and serviced regarding fire safety capability, utilities, supporting services, roads, real property maintenance, etc., and upgraded to meet new safety/safeguards standards, particularly to ensure facility safety and availability to the NE program and other programs who would use them. The backlog of required improvements for these sites continues to grow. Examples of priority improvements that need to be done are (1) priority capital work orders to ensure continued safe, secure, and efficient facility and site operations, (2) facility fire station, alarm, and detection system upgrades, and (3) facility maintenance shop addition to alleviate access problems.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: General plant projects 2. Project No.: 87-N-102

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10. **Details of cost estimate:**

Details of cost estimates for these projects are not available at this time. Detailed cost estimates for general plant projects are normally made in connection with the Request for Directive after the job has been scoped and preliminary engineering completed.

11. **Method of performance:**

Design will be by the operating contractor and negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. **Funding schedule of project funding and other related funding requirements:**

No narrative required.

13. **Narrative explanation of total project funding and other funding requirements:**

No narrative required.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
NUCLEAR ENERGY - PLANT AND CAPITAL EQUIPMENT
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
NUCLEAR ENERGY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: ANL-West physical security upgrades, Argonne National Laboratory, INEL, Idaho

2. Project No.: 85-N-602

3. Date A-E work initiated: 2nd Qtr. FY 1985

3a. Date physical construction starts: 3rd Qtr. FY 1986

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate: $ 2,000
Date: December 1985

6. Current cost estimate: $ 1,966
Less amount for PE&D: 0
Net cost estimate: $ 1,966
Date: January 1986

7. Financial schedule:

Fiscal Year	Authorization	Appropriation	Obligations	Costs
1985	$ 2,000	$ 500	$ 500	$ 200
1986	0	866	866	666
1987	0	600	600	1,100

8. Brief physical description of project:

Upgrade physical security systems as required in support of DOE-CH inspections and recommendations and the Sandia Laboratories "Safeguards Vulnerability Analysis Baseline," March 1983 study.

1.	Title and location of project:	ANL-West physical security upgrades, Argonne National Laboratory, INEL, Idaho	2. Project No.: 85-N-602

(a) Expand the General Site Security System Operational Capabilities

(1) Design and install dual computerized intrusion detection and assessment annunciation and control centers, both in hardened facilities, one acting as a totally redundant system to the other.

(2) Provide an addition of pan/tilt/zoom camera assessment capability to the perimeter.

(3) Provide an addition of a second perimeter intrusion detection system.

(4) Provide for small upgrades as a result of the perimeter vulnerability analysis.

(b) Provide Additional Structural Delay Feature at the Fuel Manufacturing Facility.

(c) Provide Sensing and Assessment Capabilities at the Radioactive Scrap and Waste Facility.

9. Purpose, justification of need for, and scope of project:

The proposed projects are part of an overall safeguards and security upgrading program at ANL-West. The projects proposed in this budget request provide incremental improvements that complement features that are either in place or are proposed to be added with prior year funding.

The proposed systems will provide: 1) sensing and assessment capabilities not available, 2) will provide time delays for unauthorized entry into areas where Special Nuclear Materials (SNM) is stored or is "in-process," 3) will permit automated assessment of activities from the Hardened Communication Center (HCC), and 4) will provide an interface at HCC in Building 701 for tie-in with the Idaho National Engineering Laboratory (INEL) Central Facilities Area (CFA) security center.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: ANL-West physical security upgrades, Argonne National Laboratory, INEL, Idaho 2. Project No.: 85-N-602

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10. Details of cost estimate: *

a.	Engineering	$ 400
b.	Construction	1,460
c.	Contingency	106
	Total	$ 1,966

*This estimate is based on completion of final design.

11. Method of performance:

Design will be accomplished by the operating contractor and by an Architect/Engineer. Procurement will be by fixed-price contracts awarded on the basis of competitive bids where feasible and installation will be accomplished by a construction contractor and operating contractor forces.

12. Funding schedule of project funding and other related funding requirements:

Not required.

13. Narrative explanation of total project funding and other funding requirements:

Not required.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET
CONSTRUCTION PROJECT DATA SHEETS
NUCLEAR ENERGY - PLANT AND CAPITAL EQUIPMENT
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Modification to reactors, various locations

2. Project No.: 87-N-101

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3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 3rd Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: None
Date:

6. Current cost estimate: $ 1,000
Less amount for PE&D: 0
Net cost estimate: $ 1,000
Date: December 1985

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7. Financial schedule:

Fiscal Year	Authorization	Appropriation	Obligations	Costs
1987	$ 1,000	$ 1,000	$ 1,000	$ 400
1988	0	0	0	600

8. Brief physical description of project:

This project will consist of modifications to the Experimental Breeder Reactor II (EBR-II) at the Argonne National Laboratory (ANL) site in Idaho, and the Fast Flux Test Facility (FFTF) complex at the Hanford Engineering Development Laboratory (HEDL) in the state of Washington. The improvements are based on operating experience and will help maintain the operating efficiency, capability, and reliability of operating these major reactor and support facilities.

9. Purpose, justification of need for, and scope of project:

Previous reactor operating experience and data acquisition have produced information relevant to improved reactor and support facility operations and improvements to maintain a high level of safety. The purpose of this project is to maintain the safety, efficiency, and reliability of major facility operations in support of space, defense, and civilian reactor applications. The following are highest priority subprojects currently identified.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
NUCLEAR
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Approp.	FY 1986 Approp.	FY 1987 Base	FY 1987 Request	Request vs Base
Remedial Action and Waste Technology (NE)					
Formerly Utilized Sites Remedial Action Project					
Operating expenses.....	$ 17,600	$ 18,763	$ 18,763	$ 25,400	$+6,637
Capital equipment	200	192	192	200	+8
Subtotal...........	17,800	18,955	18,955	25,600	+6,645
Grand Junction Remedial Action Project					
Operating expenses	1,500	866	866	800	-66
Subtotal	1,500	866	866	800	-66
Uranium Mill Tailings Remedial Action Project					
Operating expenses	59,960	90,397	90,397	123,700	+33,303
Capital equipment	750	962	962	2,300	+1,338
Subtotal	60,710	91,359	91,359	126,000	+34,641
Surplus Facilities Program					
Operating expenses	29,130	39,787	39,787	56,000	+16,213
Capital equipment	120	144	144	400	+256
Subtotal	29,250	39,931	39,931	56,400	+16,469
West Valley Demonstration Project					
Operating expenses	47,150	61,581	61,581	79,000	+17,419
Subtotal	47,150	61,581	61,581	79,000	+17,419
Low-Level Waste					
Operating expenses	5,950	4,474	4,474	4,000	-474
Capital Equipment	150	96	96	0	-96
Subtotal	6,100	4,570	4,570	4,000	-570
Waste Treatment					
Operating Expenses	5,965	5,773	5,773	0	-5,773
Capital Equipment	300	433	433	0	-433
Subtotal	6,265	6,206	6,206	0	-6,206
Byproducts Utilization					
Operating Expenses	0	4,811	4,811	0	-4,811
Subtotal	0	4,811	4,811	0	-4,811

	FY 1985 Approp.	FY 1986 Approp.	FY 1987 Base	FY 1987 Request	Request vs Base
Remedial Action and Waste Technology (cont'd)					
Program Direction					
Operating expenses	1,590	1,768	1,768	2,300	+532
Subtotal	1,590	1,768	1,768	2,300	+532
Total					
Operating expenses	168,845	228,220	228,220	291,200	+62,980
Capital equipment	1,520	1,827	1,827	2,900	+1,073
Remedial Action and Waste Tech.	$170,365a/	$230,047b/	$230,047	$294,100c/	$+64,053
Staffing Total FTE	26	30	30	32	+2

Authorization: Sec. 31, P.L. 83-703
P.L. 95-604 (Uranium Mill Tailings)
P.L. 92-314, P.L. 95-236 (Grand Junction)
P.L. 96-368 (West Valley)
P.L. 96-573 (Low-Level Waste)

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a/ The FY 1985 amount reflects a reduction of $2,600,000 for IG Audits/prior year deobligation Management Initiative Savings; $5,300,000 for the General Reduction; and $50,000 provided for Small Business Innovative Research in accordance with P.L. 97-219.

b/ Adjustments to the FY 1986 appropriation are described in the table following the Nuclear tab in this volume.

c/ The FY 1987 amount reflects a reduction of $1,722,000 for Management Initiative Savings.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
Remedial Action and Waste Technology
(In thousands of dollars)

FY 1986 Appropriation enacted	$230,047
Built in increases and decreases	0
FY 1987 base	230,047
Program increases and decreases:	
Formerly Utilized Sites Remedial Action Project	+6,645
o Continue remedial action and engineering activities at the highest priority sites. Initiate remedial action at Albany, Oregon; accelerate work at the St. Louis Airport Disposal Site consistent with project plan for disposal of Latty Avenue site waste; and proceed with surveys for selection of disposal sites in New Jersey and New York.	
Grand Junction Remedial Action Project	-66
o Complete all remedial action under this project, consistent with State of Colorado cost-sharing plans.	
Uranium Mill Tailings Remedial Action Project	+34,641
o Continue previously initiated processing site and vicinity property remedial action with completion at Salt Lake City and Shiprock; continue remedial action at 2 sites (Lakeview and Tuba City) and initiate remedial action at 6 additional processing sites (Ambrosia Lake, Durango, Grand Junction, Gunnison, Mexican Hat, and Riverton) and associated vicinity properties; complete surveys of 3,450 vicinity properties; and continue engineerng and NEPA efforts for other sites. Propose legislation to extend project through FY 1993.	
Surplus Facilities Management Program	+16,469
o Initiate conceptual design and remedial action for the Weldon Spring Site. Begin remedial action at the Monticello mill site, preliminary stablization at the contaminated Power Burst Facility in Idaho, and continue cleanup of contaminated facilities at various DOE sites.	

Summary of Changes (cont'd)

West Valley Demonstration Project .... +17,419

- Complete procurement of major systems and equipment for vitrification of high-level radioactive waste, scheduled to begin in early FY 1989.

Low-Level Waste .... -570

- Provide technical assistance to States and regions for development of new low-level waste (LLW) disposal facilities.

Waste Treatment .... -6,206

- Eliminate a program of research and development of a first generation high-level waste form; development of a second generation high-level waste form; and methods for treatment of civilian transuranic waste.

Byproducts Utilization .... -4,811

- Phase out support of a civilian byproducts utilization program with primary emphasis on food irradiation applications.

Program Direction .... +532

- Provides for 32 FTE's, an increase of 2 FTE's above the FY 1986 level, to manage remedial action and waste technology activities and increased funding to support overall program direction expenses.

FY 1987 budget request...................................... $294,100

	FY 1986 Appropriation	FY 1987 Request
Remedial Action and Waste Technology	$230,047	$294,100

The objectives of the Remedial Action and Waste Technology Program are to treat or stabilize radioactive wastes and perform decontamination and decommissioning at contaminated DOE and legislatively directed non-government facilities and sites; and facilitate development of a reliable national system for managing low-level radioactive wastes. The general approach applied to fulfilling the Remedial Action portion of this program is: (a) to verify the need for remedial action by conducting radiological surveys of suspected contaminated properties; (b) to define the method of accomplishing required remedial action, based on existing radiological criteria, by developing engineering options and conducting appropriate NEPA reviews; (c) to carry out the selected remedial action; and, (d) to certify completion of the remedial action consistent with existing radiological criteria.

The major activities under the Remedial Action and Waste Technology Program are: (1) formerly utilized sites remedial action project (FUSRAP); (2) remedial action at Grand Junction, Colorado (P.L. 92-314, as amended); (3) uranium mill tailings remedial action project (UMTRAP) for inactive uranium mill tailings sites (P.L. 95-604); (4) management of certain radioactively contaminated Department facilities declared surplus and resulting principally from civilian nuclear energy programs; (5) demonstration of the solidification of high-level radioactive wastes at West Valley for final disposal (P.L. 96-368); and (6) technical assistance to States and regions to assist them in developing new capacities for the disposal of low-level radioactive waste. International cooperative efforts, nuclear waste management training programs, and nuclear fuel cycle studies are also conducted under this program.

The major changes in the FY 1987 budget request include the following: initiate remedial action at the Albany, Oregon, FUSRAP site, begin the assessment process for selection of disposal sites in New Jersey and New York, and continue remedial actions and engineering for the highest priority FUSRAP sites; complete remedial action on all remaining properties under the Grand Junction Remedial Action Project and close out this program in FY 1988; complete remedial actions at the Salt Lake City, Utah, and Shiprock, New Mexico, UMTRAP sites, continue remedial action at the Tuba City, Arizona, and Lakeview, Oregon, sites and initiate remedial action at six additional processing sites, propose legislation to extend the UMTRA Project authorization through FY 1993; initiate remedial action at the Weldon Spring, Missouri, site, the Monticello, Utah, mill site, and the surplus contaminated Power Burst Facility at Idaho; continue procurement of major systems and equipment for solidification of high-level radioactive waste at West Valley, New York, now scheduled to begin in early FY 1989; eliminate a program of research and development of technologies for the treatment and immobilization of nuclear wastes in forms acceptable for transportation, storage, and disposal; and phase out support of a civilian byproducts utilization program which focused on food irradiation applications for food and other agricultural commodities.

Remedial Action and Waste Technology - continued

	FY 1986 Appropriation	FY 1987 Request
A. Formerly Utilized Sites Remedial Action Project..........................	$18,955	$25,600
Operating Expenses	$18,763	$25,400

The Formerly Utilized Sites Remedial Action Project (FUSRAP) provides for remedial actions at former nuclear processing facilities, most privately owned, which became radioactively contaminated from Manhattan Engineer District or Atomic Energy Commission activities and which have not been decontaminated sufficiently to meet current health effects guidelines for unrestricted use. Because of the potential health risks, site utilization is limited and property values are in some cases greatly reduced. To remedy the situation the contamination will be either stabilized in-place, with restrictions placed on site use, or the contamination will be removed and disposed of at another location. Remedial action can only be undertaken at those sites for which legislative authority exists for DOE action. In FY 1983, authority existed for work on 15 such sites. Congress added four new sites and $5,000,000 in the FY 1984 Energy and Water Development Appropriations Act with direction to initiate, as a priority action, a decontamination and decommissioning project at these sites. In 1984 DOE added five more sites to the program based on a review of authority and the need for remedial action. In the FY 1985 Energy and Water Development Appropriations Act Committee reports, Congress directed DOE to acquire the former St. Louis Airport Storage Site for disposal of wastes from the nearby Latty Avenue site. In 1985 DOE added four more sites to the program based on a review of authority and the need for remedial action. These additions bring the total number of sites under this program to 29. Remedial action has been completed on six of these sites. Continuing reviews are underway to screen approximately 140 locations where contamination may be present and DOE remedial action could be needed. Disposal sites for removed materials, if required, will be arranged with Federal, State, and local authorities. Federally owned sites will be used for temporary storage. The Oak Ridge Operations Office is the lead field office in implementing this program.

Specific FY 1985 activities included:

- o Niagara Falls Storage Site (NFSS), NY: Completed design engineering for all NFSS vicinity properties and completed remedial action for all but four vicinity properties.

- o Middlesex Landfill, NJ: Continued remedial action; completed excavation of 15,000 cubic yards of contaminated soil and closed the site temporarily.

- o Maywood, NJ: Completed cleanup of all designated vicinity properties at Maywood; began cleanup of the Ballod property; began expansion of the temporary storage area; installed monitoring wells.

- o Wayne, NJ: Completed cleanup of the bus yard and the ballfield at Wayne; began stabilization of the onsite buried waste; installed monitoring wells.

Remedial Action and Waste Technology - continued

- Colonie, NY: Completed cleanup of 24 vicinity properties at Colonie; began work for disposal of hazardous chemicals.
- Hazelwood, MO: Completed cleanup of the Latty Avenue ditches at Hazelwood; erected fencing around the storage site; covered the stored waste.
- St. Louis Airport Disposal Site (SLAPDS), MO: Completed stabilization of an eroding bank on Coldwater Creek; continued monitoring of the site.
- Middlesex Sampling Plant, NJ: Provided surveillance and maintenance.
- Palos Park, IL: Provided radiological surveillance.
- Continued National Environmental Policy Act (NEPA) documentation for other sites.
- Completed records search for approximately 100 sites; 140 sites remain to be completed by end of FY 1987.
- Completed radiological surveys for approximately 88 vicinity properties of which 25 were designated for remedial action.

In FY 1986 the following will be accomplished:

- Middlesex Landfill, NJ: Complete all remedial action.
- Maywood, NJ: Complete cleanup of the Ballod property south of the railroad spur. Complete characterization of the DOE Storage Site, Lodi commercial properties, and the Scanel properties. Complete design engineering for the north Ballod and railroad spur, the Scanel and the Lodi commercial properties. Complete expansion of the temporary storage area; provide surveillance and maintenance. Complete the preliminary engineering evaluation of stabilization and disposal options.
- Wayne, NJ: Complete cleanup of the residential vicinity properties and 35 percent of Sheffield Brook at Wayne; complete interim stabilization of the onsite buried waste; provide surveillance and maintenance.
- Colonie, NY: Complete cleanup of an additional 10 vicinity properties at Colonie; complete removal and disposal of the hazardous chemicals; provide surveillance and maintenance. Complete the preliminary engineering evaluation of stabilization and disposal options.
- Hazelwood, MO: Start onsite characterization of the Latty Avenue site; provide surveillance and maintenance.
- NFSS, NY: Complete remedial action on the remaining four vicinity properties; complete installation of the cap on the interim storage area.
- SLAPDS, MO: Acquire the site; begin site characterization and continue conceptual design; begin NEPA document preparation.
- Middlesex Sampling Plant, NJ: Provide surveillance and maintenance.

Remedial Action and Waste Technology - continued

- Palos Park, IL: Provide radiological surveillance.
- Continue site designation record and authority reviews.
- Continue radiological surveys for site designations.

The FY 1987 budget request of $25,400,000 represents an increase of $6,637,000 above the FY 1986 operating expenses appropriation. Efforts will continue for the 29 currently authorized sites with increased funding for remedial action at the priority sites, as directed by Congress, and remedial action will be initiated at one additional site. The assessment process for selection of disposal sites in New Jersey and New York will be initiated.

Specific accomplishments planned for FY 1987 include:

- Maywood, NJ: Complete characterization of the Sears and Route 17 properties; complete design engineering for the Sears properties and residential properties in Lodi. Complete remedial action on the Scanel, the north Ballod, and the railroad spur properties; begin remedial action on the Sears property. Continue surveillance and maintenance.
- Wayne, NJ: Complete cleanup at Sheffield Brook down to the Pompton River; complete characterization in the Pompton River area. Continue surveillance and maintenance.
- Colonie, NY: Complete design engineering and remedial action for the remaining vicinity properties, 10 now designated and additions. Continue surveillance and maintenance.
- Hazelwood, MO: Continue site surveillance and maintenance. Complete site characterization.
- SLAPDS, MO: Complete site characterization, preliminary engineering and some design engineering.
- Albany, OR: Complete design engineering, begin and complete 40 percent of the remedial action at the Bureau of Mines Albany Metallurgical Center.
- NFSS, NY: Complete final report of remedial action.
- Middlesex Landfill, NJ: Complete final report of remedial action.
- Middlesex Sampling Plant, NJ: Continue surveillance and maintenance.
- Palos Park, IL: Continue radiological surveillance.
- NJ Disposal Site: Complete large area survey for geology and hydrology; complete small area survey; select three potential sites and start field work (drilling).
- NY Disposal Site: Start and complete large area survey; begin small area survey.
- Complete site designation record search and authority reviews.

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1. Title and location of project: Modification to reactors, various locations   2. Project No.: 87-N-101

ANL-West

Experimental Breeder Reactor II (EBR-II) Critical Systems Mockup. This subproject will provide for the fabrication and assembly of a mockup of the EBR-II reactor and fuel handling system and will be located in the Instrument Test Facility (ITF) Building, No. 772 at ANL-West. The mockup will include sections or portions of the reactor (1) vessel, (2) grid plate, (3) cover, (4) primary tank cover, (5) primary tank wall, (6) rotating plugs, (7) storage basket, (8) transfer arm, (9) catch basin, (10) core gripper, (11) core gripper holddown, (12) fuel transfer port, (13) outlet coolant piping, and (14) rotating plugs fusible seals. It will include elevated platforms for working areas and to simulate the reactor building operating floor levels, improved lighting for the mockup area, and data instrumentation equipment.

This modification will provide improved capability to handle, retrieve, or remove subassemblies in a timely manner from the reactor for some offnormal conditions. Avoidance of extended EBR-II outages will assure availability to produce electricity for the Idaho National Engineering Laboratory while providing fuels and materials irradiations in support of civilian, space and defense energy programs.

HEDL

Test Fuel Fabrication and Characterization. The purpose of this subproject is to provide the capability to fabricate pellets from various fuel blends and establish the pre-production parameters for the Secure Automated Fabrication line. This project is essential to the consolidation of plutonium operations in the HEDL 400 Area. The subproject scope will include facility modifications, utility tie-ins, and equipment design, fabrication and installation. Services to be provided include electrical, tie-in to the ventilation systems, various process gases and process cooling water.

10. Details of cost estimate:

Details of cost estimate for these efforts are not available at this time. Detailed cost estimate for modifications to reactors are normally made after the job has been scoped, and preliminary engineering completed.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Modification to reactors, various locations 2. Project No.: 87-N-101

11. Method of performance:

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding schedule of project funding and other related funding requirements:

No narrative required.

13. Narrative explanation of total project funding and other funding requirements:

No narrative required.

Remedial Action and Waste Technology - continued

- Continue site designation surveys and verification surveys.

	FY 1986 Appropriation	FY 1987 Request
Capital Equipment	$ 192	$ 200

Capital equipment funding is required in FY 1987 for replacement of obsolete instruments and other diagnostic equipment used in the field at remedial action sites and for the acquisition of various measurement instruments and equipment needed to obtain baseline information at the contaminated sites. These instruments include mobile field radiological testing apparatus, radiometric and radon monitors, and digital data collection systems.

B. Grand Junction Remedial Action Project...........................	$ 866	$ 800

Under Title II of Public Law 92-314, Congress authorized financial assistance to the State of Colorado, to limit radiation exposure resulting from the use of uranium mill tailings for construction purposes in Grand Junction, Colorado. This cooperative effort with the State of Colorado is administered by the Colorado Department of Health through the Grand Junction Project Office. The remedial action provides for removal of uranium mill tailings from the premises of an estimated 600 structures where radon daughter exposures exceed the Surgeon General's guidelines. Public Law 95-236 extended the time for property owners to apply for inclusion in the program through June 1980, and increased the authorized program funding. Federal funds cover 75 percent of the program costs with the State providing the balance. Contingent upon the availability of State funding, remedial action is expected to be complete in FY 1987 with final radiological surveys of completed properties being conducted in FY 1988. Remedial action on four high cost commercial structures has been postponed until near the end of the program in order to give higher priority to residential structures.

In FY 1985 the following was accomplished:

- Completed remedial action on 20 structures and initiated and completed remedial action on 13 additional structures, including 2 schools.
- Completed 54 effectiveness surveys of structures remedied in FY 1983 and FY 1984 to demonstrate compliance with the Surgeon General's guidelines.

In FY 1986 the following will be accomplished:

- Complete radiological assessments at all remaining properties.
- Complete remedial action on an estimated 40 properties, including 4 commercial structures.
- Complete 60 effectiveness surveys to demonstrate compliance with the Surgeon General's guidelines.

The FY 1987 budget request of $800,000 represents the required funding to complete the program. At this level of funding the Grand Junction Remedial

Action Project will complete remedial action on all remaining properties, currently estimated at 8 new properties and 8 reassignment locations.

	FY 1986 Appropriation	FY 1987 Request
C. Uranium Mill Tailings Remedial Action Project..........................	$91,359	$126,000
Operating Expenses	$90,397	$123,700

The Uranium Mill Tailings Remedial Action Project is responsible for conducting remedial action at 24 sites and several thousand associated vicinity properties, as mandated by Public Law 95-604, "The Uranium Mill Tailings Radiation Control Act of 1978." Nine of the sites are designated as high priority, six as medium priority, and nine as low priority. The Act requires completion of the program within the seven years following the promulgation of final standards by the Environmental Protection Agency (EPA), which occurred in March 1983. The Department is proposing to extend the period of authorization until the end of FY 1993. This proposed action will be discussed in more detail later in this narrative. Remedial action will be conducted in accordance with cooperative agreements negotiated with the affected States and Indian tribes. Federal funds are to cover 90 percent of the remedial action costs (100 percent for those sites on Indian lands). The type of remedial action for the processing sites will be either to stabilize the mill tailings in-place, where feasible, or to remove the tailings to a new disposal site. In either case, the final disposal site will be Federally-owned and maintained under a license issued by the Nuclear Regulatory Commission (NRC). The program also includes the cleanup of an estimated 4,500 properties in the vicinity of the processing sites which have become contaminated with radioactive material derived from the sites. Engineering plans and environmental documents will be prepared for the cleanup and disposal operations at each site. The concurrences of the NRC and the affected State (or Tribe) are required for each site Remedial Action Plan. Day-to-day project management is provided by the Uranium Mill Tailings Remedial Action Project (UMTRAP) Office at Albuquerque, New Mexico.

In general, the project approach for each processing site includes: (1) development of a Remedial Action Plan; (2) National Environmental Policy Act (NEPA) review and required State/Tribe and NRC concurrence on the proposed remedial action; (3) detailed engineering; (4) remedial action; (5) certification of the completed remedial action; and (6) NRC licensing of the final disposal sites.

For additional details on schedules and activities for each of the processing sites and associated vicinity properties, please refer to the 22 UMTRAP Operating Expense Funded Data Sheets which are included with this submission.

The FY 1987 submission identifies the resource requirements required to meet an extended schedule beyond that established in Public Law 95-604. The project extension and current cost estimate take into consideration the complexity and experience gained in performing remedial action activities at processing sites and vicinity properties. The revised project plan is based on the following key assumptions: (1) 4,535 of the 8,156 designated vicinity properties will actually require cleanup in accordance with EPA standards, and

(2) seven of the tailings piles (i.e., Bowman, ND; Durango, CO; Grand Junction, CO; Lakeview, OR; Rifle, CO; Gunnison, CO; and Salt Lake City, UT) will be relocated.

Funding at the requested level for FY 1987 would require appropriations approaching $250,000,000 for FY 1988 and $200,000,000 for FY 1989 in order to complete the project within the currently authorized period of 7 years. The high peak in projected funding requirements results from the combined effects of a major increase in the total estimated cost (TEC) for the project and from delays encountered in reaching agreement among the many parties involved in remedial action plans. The increase in the TEC is based on actual project experience with both processing sites and vicinity properties and reflects higher than anticipated costs in meeting the requirements of the EPA standards, particularly in satisfying ground-water requirements and stabilizing tailings located in the floodplains, or, alternatively, relocating the tailings to new disposal sites.

In consideration of the effect these factors have on annual funding requirements and the large number of sites and vicinity properties which would have to be under construction simultaneously during the peak years, the Department is proposing legislation to extend the period of authorization until the end of FY 1993. This extension is consistent with the recommendation to extend the duration of the project made by the House Appropriations Committee in Report 99-195 accompanying the FY 1986 Energy and Water Development Bill.

During FY 1985 remedial action was underway on three processing sites and at more than 300 vicinity properties, and engineering design was in progress for additional sites on which construction will begin in FY 1986. Also, radiological surveys of vicinity properties were accelerated in order to determine how many of the approximately 8,000 possibly contaminated properties which have been identified, will actually require cleanup under the program.

Specific accomplishments for FY 1985 included:

o Canonsburg, PA: Completed 90 percent of the remedial action at the processing site and approximately 85 vicinity properties.

o Salt Lake City, UT: Completed engineering design and initiated and completed 12 percent of the remedial action at the processing site under the relocation to Clive, Utah, option. Completed remedial action at approximately 20 vicinity properties.

o Shiprock, NM: Completed 20 percent of the processing site remedial action and 12 vicinity properties.

o Durango, CO: Completed remedial action at 1 vicinity property. Continued work on the Remedial Action Plan, conceptual design, development of environmental documentation, and initiated design engineering.

o Grand Junction, CO: Initiated work on the Remedial Action Plan and conceptual design, and continued work on development of the environmental documentation. Completed cleanup of 15 vicinity properties and started work on an additional 121 properties.

Remedial Action and Waste Technology - continued

- Riverton, WY: Continued development of the Remedial Action Plan, conceptual design, and environmental documentation. Started design engineering work. Completed remedial action on 11 vicinity properties.
- Gunnison, CO; Tuba City, AZ; Mexican Hat, UT: Continued work on the Remedial Action Plan, conceptual design, and development of environmental documentation.
- Rifle, CO; Monument Valley, AZ; Ambrosia Lake, NM; Naturita, CO: Initiated work on the Remedial Action Plan, conceptual design, and continued development of environmental documentation.
- Lakeview, OR: Completed environmental documentation. Initiated work on the design engineering.
- Edgemont, SD: Completed remedial action at 35 vicinity properties.
- Completed the survey and inclusion of approximately 1,600 vicinity properties.

Specific accomplishments and activities planned for FY 1986 are as follows:

- Canonsburg, PA: Complete remedial action at processing site and vicinity properties. Initiate surveillance and maintenance of the site.
- Salt Lake City, UT: Complete 70 percent of the remedial action at the processing site and approximately 60 percent of the vicinity property remedial action.
- Shiprock, NM: Complete 90 percent of the remedial action at the processing site and 100 percent of vicinity properties.
- Durango, CO: Complete approximately 25 percent of vicinity property remedial action. Complete environmental documentation, the Remedial Action Plan, conceptual design, and 60 percent of the design engineering.
- Gunnison, CO: Continue preparation of environmental documentation, the Remedial Action Plan, and conceptual design.
- Grand Junction, CO: Complete environmental documentation, the Remedial Action Plan, and conceptual design. Initiate design engineering. Initiate remedial action on approximately 160 vicinity properties.
- Rifle, CO: Continue work on the Remedial Action Plan, conceptual design, and environmental documentation.
- Riverton, WY: Complete the Remedial Action Plan, conceptual design and environmental documentation. Continue design engineering for the processing site.
- Tuba City, AZ; Mexican Hat, UT; Ambrosia Lake, NM: Complete environmental documentation, the Remedial Action Plan, conceptual design, and design engineering. Initiate remedial action at the Tuba City processing site.

Remedial Action and Waste Technology - continued

- o Monument Valley, AZ: Complete environmental documentation, the Remedial Action Plan, and conceptual design. Initiate design engineering.
- o Lakeview, OR: Complete the Remedial Action Plan, conceptual design and design engineering. Initiate remedial action at the Lakeview processing site.
- o Naturita, CO; Falls City, TX; Green River, UT; Slick Rock, CO: Continue work on the Remedial Action Plan, conceptual design, and environmental documentation.
- o Maybell, CO; Belfield/Bowman, ND; Lowman, ID; Spook, WY: Initiate work on the Remedial Action Plan and conceptual design.
- o Edgemont, SD: Complete remedial action on all vicinity properties.
- o Complete the radiological survey of 2,950 vicinity properties.

The FY 1987 budget request of $123,700,000 represents an increase of $33,303,000 above the FY 1986 operating expenses appropriation.

Specific accomplishments planned for FY 1987 include:

- o Canonsburg, PA: Continue site surveillance and maintenance.
- o Shiprock, NM: Complete remedial action. Initiate surveillance and maintenance.
- o Salt Lake City, UT: Complete processing site remedial action and vicinity property remedial action. Initiate surveillance and maintenance.
- o Durango, CO: Complete 25 percent of processing site remedial action and 70 percent of vicinity property remedial action.
- o Gunnison, CO: Complete design engineering and initiate processing site remedial action.
- o Grand Junction, CO: Initiate and complete 5 percent of processing site remedial action. Initiate remedial action at approximately 800 vicinity properties.
- o Rifle, CO: Complete the Remedial Action Plan, conceptual design, environmental documentation, and design engineering. Initiate vicinity properties engineering.
- o Riverton, WY: Complete design engineering and initiate processing site remedial action.
- o Tuba City, AZ: Complete vicinity property remedial action and 20 percent of processing site remedial action.
- o Ambrosia Lake, NM; Mexican Hat, UT: Initiate processing site remedial action.

Remedial Action and Waste Technology - continued

- Lakeview, OR: Complete 85 percent of processing site remedial action and complete work on 6 vicinity properties.
- Naturita, CO; Falls City, TX; Green River, UT; Slick Rock, CO; Belfield/Bowman, ND; Maybell, CO: Complete the Remedial Action Plan, conceptual design, and environmental documentation. Initiate design engineering.
- Lowman, ID; Spook, WY: Continue work on environmental documentation and initiate design engineering.
- Complete the survey of 3,450 vicinity properties, thus completing this work at all sites except Grand Junction, CO.

	FY 1986 Appropriation	FY 1987 Request
Capital equipment.........................	$ 962	$ 2,300

The increase in capital equipment requirements for FY 1987 is primarily due to the higher operating level and a schedule which has several sites under construction concurrently. This schedule requires radon gas counting systems to be maintained at each site, whereas the original intent was to transfer equipment from site to site. The schedule also requires a large number of field measurements to be made and the inventory of maintenance/backup equipment and parts must be adequate to ensure that equipment-related personnel downtime is minimized. The types of equipment required include: health physics equipment, working level monitors, radon gas monitors, meteorological stations, counting chambers, radon daughter monitors and readout units, delta-gamma instruments, microcomputer systems, gamma-ray scintillometers, coring and augering equipment, and geochemistry laboratory equipment.

D. Surplus Facilities Program..............	$39,931	$56,400
Operating expenses	$39,787	$56,000

This program provides for the safe management and disposition of an inventory of surplus radioactively contaminated Department-owned facilities from the civilian nuclear energy development programs. After the facilities are decontaminated they are returned to other productive use as appropriate. All defense-related facilities are included in the Defense Nuclear Waste Management Budget. Currently 35 projects (including ore handling and processing, reactor, laboratory, and fuel fabrication facilities) are identified under this civilian activity. In addition, surveillance and maintenance of surplus facilities is provided to assure they remain environmentally safe until cleanup can be accomplished and improved methods for decontamination and decommissioning are developed which can be transferred to industry. A long range plan was completed in 1985 to establish the overall schedule and priorities for sites currently in the surplus inventory. This plan provides for completion of decommissioning of the current inventory by the early 2000's. Priorities are established formally through analysis of health/safety, legal, economic, and work continuity considerations for each site and work plans are developed based on these priorities. The Richland Operations Office is the lead field office in implementing the program.

Remedial Action and Waste Technology - continued

Specific FY 1985 activities included:

- Shippingport Station Decommissioning Project (SSDP), PA: Completed Operations and Maintenance phase of contract with the start of Decommissioning phase. Initiated decommissioning operations preparation and conducted contractor readiness review prior to start of physical decontamination and decommissioning (D&D) activities.
- Weldon Spring, MO: Completed radiological characterization of the Weldon Spring Quarry, prepared the Engineering Evaluation of Alternatives Addendum, and issued Request for Proposal (RFP) for a management contractor.
- Niagara Falls Storage Site (NFSS), NY: Prepared preliminary final Environmental Impact Statement (EIS) for site disposition and completed transfer of the higher activity pitchblende residues from the concrete tower, where they were stored, to the waste containment area.
- Mound Laboratory, OH: Completed 72 percent of the Mound D&D activities for contaminated plutonium facilities.
- Santa Susana Field Laboratory, CA: Completed Bldg. 055 plutonium glovebox removal and packaging.
- Monticello, UT: Completed cleanup of 15 vicinity properties (50 percent of properties completed) and completed the draft Environmental Assessment (EA) for the mill site.
- Argonne National Laboratory (ANL) - East, IL: Completed 63 percent of D&D activities for old contaminated facilities.
- Idaho National Engineering Laboratory (INEL), ID: Completed the Special Power Excursion Reactor Test (SPERT) I reactor building decommissioning.

In FY 1986 the following will be accomplished:

- NFSS, NY: Complete interim storage facility and treatment of contaminated water. Complete final EIS and record of decision.
- SSDP, PA: Begin physical decommissioning of the Shippingport Atomic Power Station. Complete removal of plant asbestos.
- Weldon Spring, MO: Complete the draft EIS, and continue conceptual engineering and site characterization at Weldon Spring. Select the contractor to manage cleanup of Weldon Spring.
- Mound Laboratory, OH: Complete 82 percent of the Mound D&D activities including 8 plutonium processing building labs, removal of the Waste Transfer System, and demolition of Bldg. 41 and tanks.
- Monticello, UT: Complete cleanup of 7 additional vicinity properties at Monticello (62 percent complete) and complete the EA for the mill site.

Remedial Action and Waste Technology - continued

- ANL-East, IL: Complete D&D of surplus facilities in the East area, and initiate preparation for physical decommissioning of the Experimental Boiling Water Reactor (EBWR).
- Los Alamos National Laboratory (LANL), NM: Complete Phase I D&D of the Technical Area-2 (TA-2) Water Boiler Reactor and associated facilities.
- INEL, ID: Complete the SPERT I reactor building final report which completes the SPERT and BORAX ancillaries remedial action.
- Center for Energy and Environment Research (CEER), PR: Initiate D&D of the CEER Facility near Mayaquez, Puerto Rico.
- Santa Susana, CA: Complete excavation of the Radioactive Material Disposal Facility (RMDF) septic tank. Complete D&D, waste shipments and final reports for the plutonium processing facility (Bldg. 055).
- Continue surveillance and maintenance for other surplus DOE facilities.

The FY 1987 budget request of $56,000,000 represents an increase of $16,213,000 above the FY 1986 operating expenses appropriation.

Specific accomplishments planned for FY 1987 include:

- NFSS, NY: Demobilize contractors. Conduct surveillance and maintenance.
- SSDP, PA: Continue dismantlement of the Shippingport Atomic Power Station at a pace consistent with the project schedule and complete by May 1990. For additional detail on schedules and activities see the Operating Expense Funded Data Sheet included with this submission.
- Weldon Spring, MO: Complete the final EIS and record of decision for the Weldon Spring Site. Complete characterization and initiate conceptual engineering for the Weldon Spring Remedial Action Project. Begin demolition of non-radiologically contaminated buildings at the Chemical Plant. For additional detail on schedules and activities see the Operating Expense Funded Data Sheet included with this submission.
- Mound Laboratory, OH: Complete most of the remaining physical D&D activities at the Advanced Nuclear Systems and Projects Division (ANSPD) areas. For additional detail on schedules and activities see the Operating Expense Funded Data Sheet included with this submission.
- Monticello, UT: Complete remedial action on 12 vicinity properties and initiate mill site remedial action. For additional detail on schedules and activities see the Operating Expense Funded Data Sheet included with this submission.
- LANL, NM: Initiate D&D of the TA-52 Ultra High Temperature Reactor Experiment (UHTREX).
- CEER, PR: Complete physical D&D of the CEER Facility.

Remedial Action and Waste Technology - continued

- Santa Susana, CA: Continue D&D of the RMDF buildings; continue disposition of NaK and lithium and initiate D&D of the Systems for Nuclear Auxiliary Power (SNAP) 8 Test Facility (Bldg. 059).
- INEL, ID: Initiate stabilization of the Power Burst Facility (PBF) and remove fuel to dry storage in preparation for delayed future decommissioning. Continue D&D of the BORAX V facility.
- ANL-East, IL: Initiate D&D of the Experimental Boiling Water Reactor (EBWR).
- Continue surveillance and maintenance of other surplus DOE facilities.

	FY 1986 Appropriation	FY 1987 Request
Capital Equipment	$ 144	$ 400

The capital equipment funding requested is to purchase test equipment and instrumentation in support of the disposition of a number of surplus DOE facilities. These funds will provide equipment such as atomic absorption spectrophotometers, special remote handling and cutting equipment, shielding devices, radiation survey instruments, air monitoring equipment, and electronic radon monitoring devices. Laboratory analysis equipment will also be purchased for environmental monitoring and sampling during remedial action activities.

E. West Valley Demonstration Project........	$ 61,581	$ 79,000
Operating Expenses	$ 61,581	$ 79,000

The objective of the West Valley Demonstration Project is to demonstrate solidification for disposal of high-level nuclear wastes under the provisions of P.L. 96-368, the "West Valley Demonstration Project Act" enacted in 1980. The project will carry out an integrated production-scale development and demonstration project for treating the alkaline and acidic high-level liquid nuclear wastes at the Western New York Nuclear Service Center, near West Valley, New York. The Center reprocessed nuclear fuel from 1966 to 1972. During that time, approximately 560,000 gallons of alkaline high-level waste (HLW) was generated by this activity and stored in a carbon steel tank located in an underground concrete vault. The alkaline waste is simiiar to that stored at the Department's Savannah River and Hanford sites in that these wastes also consist of a supernatant liquid and a sludge that has formed on the tank bottom. A smaller amount (about 12,000 gallons) of acidic Thorex waste, stored in a stainless steel tank located in a separate underground concrete vault, will also be treated.

Major activities embodied in the project include: (1) necessary decontamination required to prepare existing facilities and equipment at the Center to accommodate the solidification project; (2) removal of the wastes from the underground storage tanks; (3) development, design, construction, and operation of systems and necessary supporting facilities for the solidification of the wastes; (4) acquisition of containers for the permanent disposal of the solidified waste; (5) temporary storage and transportation of the solidified waste to an appropriate Federal repository for permanent disposal; (6) decontamination and decommissioning (D&D) of the waste tanks, facilities, hardware, and material used in carrying out the project; and (7) disposal of low-level waste (LLW) and transuranic (TRU) wastes produced from project activities.

The project strategy is to demonstrate that current high-level waste solidification technology can be readily and promptly adapted to the particular chemistry of the stored West Valley wastes. The Project will minimize new construction by reusing existing space, facilities, and equipment, where feasible; use straightforward engineering methods and eliminate undue or over-elaborate analyses and design; aggressively pursue opportunities which produce technical, cost and schedule benefits; and accept no shortcuts on safety and environmental protection. The approach will achieve solidification at the earliest time consistent with minimizing total project costs and assuring safety. The technical approach is to utilize the U.S. developed liquid-fed ceramic melter process and a borosilicate glass waste form; to construct and operate a nonradioactive vitrification component test stand consisting of the key components (e.g., feed tank, feed concentrator, slurry fed ceramic melter, canister turntable, first stage of off-gas treatment system, and adjunct systems required for operation) with the objective of verifying component performance of integrated process operations and remote design and operation, supporting final vitrification detailed design, training operators, providing samples for product qualification and finalizing operating and maintenance procedures; and to convert the test stand and components for radioactive operation.

The primary technical objectives during FY 1986 include:

Complete design of sludge mobilization and removal equipment, complete supernatant treatment processing system civil construction and procurement, make significant progress on refurbishment of the Chemical Process Cell and the Equipment Decontamination Room (EDR), and complete modifications to several cells in preparation for installation of a liquid radioactive waste treatment system.

Coordination with the Nuclear Regulatory Commission, and other Federal agencies and the State of New York will continue, so as to keep them informed of project plans and progress and to obtain their advice on project-related matters. The project is also coordinating with ongoing activities being conducted by the Nuclear Waste Treatment Program, Office of Civilian Radioactive Waste Management, international waste treatment programs, and the Savannah River Plant Defense Waste Processing Facility funded by Defense Programs.

An estimate for the post-solidification phase (e.g., final decontamination and decommissioning) will be prepared after coordination with the Nuclear Regulatory Commission and the State of New York and after preparation of appropriate NEPA documents; this estimate is scheduled for completion by 1988. A scoping cost estimate for certain potential plans of action for the post-solidification phase will be available in early 1986.

The FY 1987 budget request of $79,000,000 represents an increase of $17,419,000 above the FY 1986 appropriation. The FY 1987 requested funds will be used to complete procurement of equipment and systems and related construction for processing supernatant; complete procurement and construction of vitrification systems and LLW processing systems. Nonradioactive testing of the component test stand and decontamination of several major cells for reuse by the project will continue and installation in decontaminated plant areas and cells of equipment for HLW interim storage, size reduction, and TRU decontamination will begin. Specifically, the following tasks will be performed:

(1) HLW Solidification: Procure sludge mobilization and removal equipment, make several required penetrations to the roof of tank 8D-2, install removal equipment, and issue equipment operating procedures. Process supernatant beginning in early- to mid-FY 1987; the supernatant represents approximately 90 percent of the volume and 50 percent of the radioactivity contained in the underground storage tanks. Complete a major portion of the radioactive conversion engineering and design for the Component Test Stand (CTS). Complete construction of the CTS shield walls and fabrication and delivery of vitrification process components. Begin construction of the tunnel connecting the CTS and the Chemical Process Cell (CPC) HLW interim storage area and begin installation of utilities. Begin modifications to the CPC in preparation for equipment installation.

(2) Decontamination and Decommissioning: The Project strategy is to conduct clean out of the hot cells on a schedule which matches reuse of the hot cells. Decontamination and painting of the CPC, completed by mid-year FY 1987, will be followed by decontamination of the EDR in the fourth quarter of FY 1987. Availability of these two cells will permit start of modifications to the CPC for interim storage of HLW. Refurbishment of the Fuel Receiving Station will be partially complete, permitting installation of initial size reduction equipment. Survey and start of decontamination of other cells will be consistent with overall cell needs.

(3) Site Operations: Efforts in this area will increase modestly in FY 1987 as additional project systems are brought into productive operation. New efforts are associated with full operation of the CTS and the radwaste treatment system for solidifying LLW into cement. Continuing efforts include operation and maintenance in support of the plant utilities room, cooling tower, warehouse, process plant ventilation system, quality assurance lab, alpha lab, analytical cells, HLW tank farm, sewage treatment plant, existing low-level waste treatment system, air compressors, diesel generator, water treatment plant, process building offices ventilation system, fire pumps, and the environmental, analytical chemical and radiochemical laboratories. Purchases for the year to support overall site operations will include chemicals for water, sewage, and LLW treatment, anticontamination clothing, filters, and operations equipment to support supernatant and sludge treatment.

To support the HLW solidification, decontamination, site operations and LLW/TRU waste handling activities, major efforts are required in the areas of industrial hygiene and safety, quality assurance, procurement/contracts, radiological surveillance, environmental monitoring, laboratory analysis, personal dosimetry, and physical security and safeguards.

(4) Low-Level and Transuranic Waste Handling: Refurbishment of the Fuel Receiving Station will be partially complete and installation of size reduction equipment started. The Cement Solidification Subsystem will be in full operation throughout FY 1987 and the Liquid Waste Treatment Subsystem will be operational by mid FY 1987.

In summary, the West Valley Project will continue an aggressive pace in FY 1987 without compromising the schedule or the dedication to the protection of both workers and the environment. In particular, the Project goals include the following:

- Minimize the Total Project Cost Estimate.
- Maintain the earliest feasible schedule for start of solidification consistent with available funding for equipment procurement and construction.
- Procure sludge removal and mobilization equipment, start waste tank modifications, and start equipment installation.
- Process supernatant beginning in early- to mid-FY 1987.
- Continue nonradioactive testing of the Component Test Stand; complete a major portion of the radioactive conversion engineering and design.
- Begin installation of size reduction/TRU decontamination system.
- Perform hot cell decontamination and modifications as necessary to support the above without significant new construction.

	FY 1986 Appropriation	FY 1987 Request
F. Low-Level Waste..........................	$ 4,570	$ 4,000
Operating Expenses	$ 4,474	$ 4,000

The goal of the Low-Level Waste Program is to facilitate the establishment of a reliable nationwide system for management of civilian low-level radioactive waste (LLW). P.L. 96-573, the "Low-Level Radioactive Waste Policy Act," assigned States the responsibility for assuring disposal capacity for low-level radioactive waste generated within their borders. The formation of regional compacts to satisfy this responsibility was encouraged by the Act. Presently, only three LLW disposal facilities operate in the commercial sector. The United States will exhaust its existing disposal capacity in one or more of these facilities by the early 1990s if the current disposal system is not expanded. It is also recognized that technology exists today to dispose of LLW safely, but continued improvements in specific practices, techniques, information, and procedures will result in a more efficient, safe, and effective system for LLW management and disposal. Additionally, several regional compacts specifically require that disposal facilities employ alternative technologies, other than shallow land burial currently being practiced at the three operating sites, for disposal of low-level waste.

It is assumed that States will have joined regional compacts or decided individually to manage their own LLW in 1986. Beginning in FY 1985 support for compact development was phased down significantly. Since no State or region has identified a new LLW disposal site, and given the 3-5 years required for facility construction and licensing, it is unlikely that a new facility could become operational before 1990. Therefore, DOE assistance will be directed at helping States site new LLW disposal facilities and assisting in the evaluation of appropriate waste treatment and disposal technologies. For the long term, States and/or regional compacts are expected to assume the regional management costs for their disposal sites, general technical improvements, and operation of the overall system through appropriate user fees.

During FY 1986 the LLW Program will focus primarily on meeting the generic technical needs of the States and regions and will provide assistance directly to States and regions to support selection and operation of new LLW disposal facilities. The program will support the continued correction of problems and stabilization efforts at disposal sites no longer in operation and will continue to develop innovative methods for the treatment of LLW. Technology developments being studied for the disposal of DOE low-level waste will be assessed and information transferred to the private sector where appropriate.

In December 1985, Congress passed the "Low-Level Radioactive Waste Policy Amendments Act of 1985." This legislation assigns several new responsibilities to the Department relating to management of civilian low-level waste, assistance to regions and states, and annual reporting to the Congress on how low-level waste is being managed in the U.S.

The FY 1987 budget request of $4,000,000 represents a decrease of $474,000 below the FY 1986 operating expenses appropriation. States and/or compact regions will be expected to assume essentially all of their particular disposal system development costs. At this level of funding the Low-Level Waste Program will continue to provide technical support and assistance to States and regions for the development of new LLW disposal facilities, pending further definition of the Department's role under the 1985 amendments to the Low-Level Waste Policy Act.

	FY 1986 Appropriation	FY 1987 Request
Capital equipment	$ 96	$ 0

The FY 1986 capital equipment funds are required for minor improvements to the computer-based LLW tracking system, and laboratory equipment for experiments to improve shallow land disposal and for other disposal site stabilization studies.

G. Waste Treatment..........................	$ 6,206	$ 0
Operating expenses.......................	$ 5,773	$ 0

The goal of the Waste Treatment Program, over the past five years, has been to develop and transfer technologies for the treatment and immobilization of nuclear wastes in forms acceptable for transportation, storage, and disposal. This included identification and characterization of the types of nuclear wastes requiring treatment; developing new waste treatment technologies; evaluating the developed technologies in terms of reliability, efficiency, cost effectiveness, and adequacy in meeting environmental, safety, and health protection requirements; and providing a technical resource for other Departmental waste management programs. Efforts have been focused on determining the long-term reliability and maintainability of a prototypical high-level waste treatment system, on testing and selecting acceptable high-level waste forms for storage or disposal, and on transferring treatment technologies to specific Departmental waste management programs such as the West Valley Demonstration Project.

In FY 1985, a year of testing the first-generation high-level waste vitrification system was completed, including preparations for cooperative testing with the Federal Republic of Germany (FRG) and Japan. A limited effort was begun on developing a second-generation high-level waste form with improved performance properties. Transuranic (TRU) waste treatment technology development efforts included evaluation of alternate TRU waste treatment strategies, conduct of preliminary tests on TRU decontamination techniques and processes and initiation of economic assessment studies of alternative TRU waste treatment systems.

Planned accomplishments in FY 1986 include:

- o Complete the second year of the planned 5-year project to determine the operational reliability, safety, and process control flexibility of the ceramic melter system for solidification of high-level radicactive wastes.
- o Continue the collaborative program with the FRG and Japan on testing of a radioactive vitrification system.
- o Phase out work on development of second-generation HLW forms and TRU waste treatment processes.
- o Coordinate waste treatment activities with other DOE programs and ensure that U.S. obligations set forth in exchange agreements with the FRG and Japan are satisfied to the maximum extent possible while maintaining an orderly shutdown of this program.
- o Evaluate issues related to transportation and treatment of sodium-contaminated wastes and close out this activity.

In FY 1987, radioactive testing of the HLW vitrification system at the Pacific Northwest Laboratory (PNL) will be terminated and the system shutdown. Reports on research results obtained in FY 1986 will be completed. Commitments to the FRG will be met; the bilateral agreement with Japan on ceramic melter testing may have to be terminated.

	FY 1986 Appropriation	FY 1987 Request
Capital equipment..........................	$ 433	$ 0

The FY 1986 equipment funding is required to make improvements in vitrification facility off-gas treatment and monitoring systems, instrumentation for the liquid-fed ceramic melter systems, and to obtain analytical instruments for use in characterizing the produced waste forms. Instrumentation required includes manipulators, sampling and on-line analysis equipment, core drills, and feed chemistry control equipment.

	FY 1986 Appropriation	FY 1987 Request
H. Byproducts Utilization.....................	$ 4,811	$ 0
Operating expenses.	$ 4,811	$ 0

The goal of the Byproducts Utilization Program, as provided by Congress, is to develop and transfer technology for the beneficial uses of nuclear waste byproducts. Irradiation of food and other agricultural commodities will be emphasized in cooperation with States, other Federal agencies, and private sector organizations. Efforts will be focused on establishing demonstration commodity irradiation facilities in States selected on their nearness to major agricultural commodity production and processing centers. Cooperative funding will be sought from the private sector. Also the program will focus on developing an adequate U.S. based supply of irradiation sources for commodity irradiations.

I. Program Direction..........................	$ 1,768	$ 2,300

The Remedial Action and Waste Technology program direction FY 1987 budget request is $2,300,000, an increase of $532,000 above the FY 1986 appropriation. This budget provides for 32 full-time equivalents (FTEs), which is an increase of 2 FTEs above the current FY 1986 level. The budget covers employee salaries, overtime, incentive awards, benefits, and the travel expenses directly related to program accomplishment. The travel expenses include both headquarters and dedicated field office personnel who support the Remedial Action and Waste Technology Program. The budget level requested provides for the normal increased personnel costs over the FY 1986 level, such as within-grade increases, promotions, etc., and allows for some increase in travel expenses consistent with the emphasis placed on decentralized field management of program activities. The distribution of FY 1987 funding is as follows: personnel compensation $1,760,000; benefits $215,000; contractual services and supplies $115,000; travel $200,000; and training $10,000.

The current FY 1986 staffing level of 30 FTEs has been adjusted from the original budget request of 27 FTEs. This reallocation, from other Departmental accounts, reflects realignment of on-board Federal employees who are providing required support to the Remedial Action and Waste Technology Program. Funding to support these positions will be derived from the FY 1986 appropriated level of $1,768,000 and from unobligated prior year program direction carryover.

The FY 1987 request provides for 26 full-time equivalent positions at headquarters, an increase of 1 over FY 1986, to provide overall management of the Remedial Action and Waste Technology Program activities. Responsibilities include developing policy; administration-budget formulation and execution; long range planning; issuing guidance; monitoring and evaluating contractor performance; and providing the link between the Department and other agencies, the Congress, public interest constituencies, and the private sector on Remedial Action and Waste Technology activities. These programs require extensive coordination with other Federal agencies, property owners, State and local governments, the Indian Nations, and other nations. Additionally, the budget provides for 6 full-time equivalent positions at Grand Junction, Colorado, an increase of 1 above the FY 1986 level, to provide on-site management support to the Remedial Action programs being conducted in that region of the country and are essential for effective management of these expanding cleanup activities.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
NUCLEAR ENERGY

Energy Supply Research and Development
Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Canonsburg Uranium Mill Tailings Project
Canonsburg, Pennsylvania

Total Estimated Cost (TEC): $43,511,000

Canonsburg Uranium Mill Tailings Project
Canonsburg, Pennsylvania

Total Estimated Cost (TEC): $43,511,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 15,137	$ 12,119	$ 12,119	$ 12,119	$ 3,113	$ 3,113	$ 0	$ 0
Research and development	5,117	172	172	172	269	269	8	8
Facility operations	0	0	0	0	74	74	52	52
Direct project related support cost	8,178	327	327	327	220	220	157	157
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	28,432	12,618	12,618	12,618	3,676	3,676	217	217
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	28,432	12,618	12,618	12,618	3,676	3,676	217	217
Non-DOE funding:								
State share	(1,514)	(1,212)	(1,212)	(1,212)	(311)	(311)	0	0
Total Project funding	$ 26,918	$ 11,406	$ 11,406	$ 11,406	$ 3,365	$ 3,365	$ 217	$ 217

Canonsburg Uranium Mill Tailings Project
Canonsburg, Pennsylvania

Total Estimated Cost (TEC): $43,511,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and development	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Research and development	0	0	0	0	0	0
Facility operations	82	82	87	87	0	0
Direct project related support costs	300	300	287	287	112	112
Capital equipment	0	0	0	0	0	0
Total operating expenses	382	382	374	374	112	112
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	382	382	374	374	112	112
Non-DOE funding:						
State share	0	0	0	0	0	0
Total Project funding	$ 382	$ 382	$ 374	$ 374	$ 112	$ 112

Canonsburg Uranium Mill Tailings Project
Canonsburg, Pennsylvania

Total Estimated Cost (TEC): $43,511,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 30,369
Research and development	0	0	0	0	0	0	5,566
Facility operations	61	61	22	22	23	23	401
Direct project related support costs	278	278	171	171	182	182	10,212
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	339	339	193	193	205	205	46,548
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	339	339	193	193	205	205	46,548
Non-DOE funding:							
State share	0	0	0	0	0	0	(3,037)
Total Project funding:	$ 339	$ 339	$ 193	$ 193	$ 205	$ 205	$ 43,511

Canonsburg Uranium Mill Tailings Project
Canonsburg, Pennsylvania

Total Estimated Cost (TEC): $43,511,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Southwestern Pennsylvania, 20 miles southwest of downtown Pittsburgh, in the Borough of Canonsburg (within the corporate boundaries); the Burrell Township tailings are near Blairsville, 40 miles east of Pittsburgh.

Site Description

Canonsburg was used primarily as a site where radium and uranium were extracted from scrap materials, ores, and concentrates. The original 18.6-acre site will be expanded to 30 acres to include the Georges Pottery property and 5 acres of residential property. The site is bounded by Chartiers Creek and the ConRail Railroad. It is enclosed by the residential communities of Canonsburg, Houston, and Strabane, Pennsylvania. The site has 114 associated vicinity properties.

Canonsburg Uranium Mill Tailings Project
Canonsburg, Pennsylvania

Total Estimated Cost (TEC): $43,311,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Canonsburg site:

Activity	Start	Complete
Environmental Document	05/81	09/83
Conceptual Design	07/82	11/83
Final Design	05/83	02/84
Vicinity Property Remedial Action	10/82	11/85
Processing Site Remedial Action	10/83	04/86
Surveillance and Maintenance	05/86	90

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistant Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

Vicinity property remedial action continued with remedial actions completed on a total of approximately 101 vicinity properties. Approximately 90 percent of processing site remedial action was completed.

Canonsburg Uranium Mill Tailings Project
Canonsburg, Pennsylvania

Total Estimated Cost (TEC): $43,511,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

FY 1988

Complete Burrell vicinity property remedial action. Complete remedial action at remaining vicinity properties and processing site. Complete processing site certification and submit license to the NRC. Initiate surveillance and maintenance activities.

(d) Current Year Achievements (FY 1987)

Continue processing site surveillance and maintenance activities.

(e) Reasons for Increase and Decreases

Reasons for the increase from the FY 1986 Budget Operating Expense Funded Data Sheet (TEC = $41,035,000) are as follows:

(1) An increase in the encapsulation cell quantities of more than 80 percent: $2,451,000
(2) An increase for additional data collection and audit costs: $87,000
(3) A reduction in the estimated cost for surveillance and maintenance: ($155,000)
(4) An increase in the estimated management support costs: $345,000
(5) An increase in state-share payments due to the TEC increase: ($252,000)

Canonsburg Uranium Mill Tailings Project
Canonsburg, Pennsylvania

Total Estimated Cost (TEC): $43,511,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimates

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Canonsburg, Pennsylvania.

	Total Cost
Design and construction	$ 30,369
Research and development	5,566
Facility operations	401
Direct project related support costs	10,212
Total DOE Cost	46,548
Non-DOE Costs	(3,037)
Total Estimated Cost	$ 43,511

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
NUCLEAR ENERGY

Energy Supply Research and Development
Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Salt Lake City Uranium Mill Tailings Project
Salt Lake City, Utah

Total Estimated Cost (TEC): $89,082,000

Salt Lake City Uranium Mill Tailings Project
Salt Lake City, Utah

Total Estimated Cost (TEC): $89,082,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 6,367	$ 18,545	$ 18,545	$ 18,545	$ 30,702	$ 30,702	$ 22,805	$ 22,805
Research and development	5,281	839	839	839	81	81	108	108
Facility operations	0	0	0	0	0	0	78	78
Direct project related support cost	5,910	314	314	314	111	111	1,623	1,623
Capital equipment	0	0	0	0	0	0	0	0
Total operating expanses	17,558	19,698	19,698	19,698	30,894	30,894	24,614	24,614
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	17,558	19,698	19,698	19,698	30,894	30,894	24,614	24,614
Non-DOE funding:								
State share	(637)	(1,855)	(1,855)	(1,855)	(3,070)	(3,070)	(2,280)	(2,280)
Total Project funding	$ 16,921	$ 17,843	$ 17,843	$ 17,843	$ 27,824	$ 27,824	$ 22,334	$ 22,334

Salt Lake City Uranium Mill Tailings Project
Salt Lake City, Utah

Total Estimated Cost (TEC): $89,082,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and development	$ 3,076	$ 3,076	$ 0	$ 0	$ 0	$ 0
Research and development	35	35	0	0	0	0
Facility operations	72	72	42	42	35	35
Direct project related support costs	349	349	198	198	159	159
Capital equipment	0	0	0	0	0	0
Total operating expenses	3,532	3,532	240	240	194	194
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	3,532	3,532	240	240	194	194
Non-DOE funding:						
State share	(308)	(308)	0	0	0	0
Total Project funding	$ 3,224	$ 3,224	$ 240	$ 240	$ 194	$ 194

Salt Lake City Uranium Mill Tailings Project
Salt Lake City, Utah

Total Estimated Cost (TEC): $89,082,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 81,495
Research and development	0	0	0	0	0	0	6,344
Facility operations	0	0	18	18	19	19	264
Direct project related support costs	115	115	170	170	180	180	9,129
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	115	115	188	188	199	199	97,232
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	115	115	188	188	199	199	97,232
Non-DOE funding:							
State share	0	0	0	0	0	0	(8,150)
Total Project funding:	$ 115	$ 115	$ 188	$ 188	$ 199	$ 199	$ 89,082

Salt Lake City Uranium Mill Tailings Project
Salt Lake City, Utah

Total Estimated Cost (TEC): $[illegible]

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- o With the full participation of the affected states and Indian tribes.
- o In accordance with standards issued by the Environmental Protection Agency (EPA).
- o With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Four miles southeast of downtown Salt Lake City, Utah.

Site Description

The Vitro site is located in a light industrial area of the city of South Salt Lake. It abuts three sides of an operating sewage treatment plant which is undergoing expansion. The total site covers [illegible] acres. The tailings were contained in three separate ponds comprising [illegible] acres. The acreage also includes an ore storage area and the old mill site. Portions of the unstabilized tailings have been covered with sewage sludge. The major buildings have been demolished but a considerable amount of rubble remains on the site. Between 1951 and 1964, 1.7 million tons of uranium ore were processed and from 1964 to 1968, [illegible] tons of vanadium ore were processed on the site.

Salt Lake City Uranium Mill Tailings Project
Salt Lake City, Utah

Total Estimated Cost (TEC): $89,082,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Salt Lake City site:

Activity	Start	Complete
Environmental Document	04/81	10/84
Conceptual Design	07/82	12/84
Final Design	07/84	12/84
Vicinity Property Remedial Action	03/81	03/87
Processing Site Remedial Action	02/85	03/87
Surveillance and Maintenance	04/87	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistant Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. However, in Salt Lake City the situation differs in that pursuant to a mutual agreement between the Governor of Utah and the Secretary of DOE, the State of Utah is responsible for remedial action at the processing site and removal of the tailings to Clive, Utah. The construction manager in this instance is the Utah Department of Transportation working in conjunction with the Utah Department of Health. Construction is being performed by a State-managed contractor, the Argee Corporation.

(c) Prior Year Achievements

FY 1985

Vicinity property engineering and remedial action continued with completion of remedial action on a total of 45 properties. Processing site engineering was completed and remedial action was initiated to relocate the contaminated materials to Clive, Utah.

Salt Lake City Uranium Mill Tailings Project
Salt Lake City, Utah

Total Estimated Cost (TEC): $89,082,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

FY 1986

Complete remedial action on 40 vicinity properties and 70 percent of processing site remedial action.

(d) Current Year Achievements (FY 1987)

Complete remainder of vicinity property and processing site remedial action and initiate site certification, licensing by NRC, and surveillance and maintenance activities.

(e) Reasons for Increases and Decreases

Reasons for the decrease from the FY 1986 Budget Operating Expense Funded Data Sheet (TEC = $93,115,000) are as follows:

(1) Contract award at a price less than estimated: ($8,755,000)
(2) Increased cost for radiation and construction safety audits and data collection: $836,000
(3) Increased period for surveillance and maintenance: $138,000
(4) A reduction in the estimated management support costs: ($818,000)
(5) Decreased state-share payments in relation to the TEC decrease: $4,566,000

Salt Lake City Uranium Mill Tailings Project
Salt Lake City, Utah

Total Estimated Cost (TEC): $89,082,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimates

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Salt Lake City, Utah.

	Total Cost
Design and construction	$ 81,495
Research and development	6,344
Facility operations	264
Direct project related support costs	9,129
Total DOE Cost	97,232
Non-DOE Costs	(8,150)
Total Estimated Cost	$ 89,082

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(Tabular dollars in thousands. Narrative material in whole dollars.)

Shiprock Uranium Mill Tailings Project
Shiprock, New Mexico

Total Estimated Cost (TEC): $23,798,000

Shiprock Uranium Mill Tailings Project
Shiprock, New Mexico

Total Estimated Cost (TEC): $23,798,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 506	$ 2,193	$ 2,193	$ 2,193	$ 10,599	$ 10,599	$ 3,246	$ 3,246
Research and development	2,961	326	326	326	167	167	162	162
Facility operations	0	0	0	0	0	0	78	78
Direct project related support costs	1,363	258	258	258	149	149	265	265
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	4,830	2,777	2,777	2,777	10,915	10,915	3,751	3,751
Other DOE Funding	0	0	0	0	0	0	0	0
Total DOE funding	4,830	2,777	2,777	2,777	10,915	10,915	3,751	3,751
Non-DOE Funding:								
State share	0	0	0	0	0	0	0	0
Total Project funding	$ 4,830	$ 2,777	$ 2,777	$ 2,777	$ 10,915	$ 10,915	$ 3,751	$ 3,751

Shiprock Uranium Mill Tailings Project
Shiprock, New Mexico

Total Estimated Cost (TEC): $23,798,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Research and development	24	24	0	0	0	0
Facility operations	82	82	55	55	55	55
Direct project related support costs	349	349	241	241	206	206
Capital equipment	0	0	0	0	0	0
Total operating expenses	455	455	296	296	261	261
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	455	455	296	296	261	261
Non-DOE funding:						
State share	0	0	0	0	0	0
Total Project funding	$ 455	$ 455	$ 296	$ 296	$ 261	$ 261

Shiprock Uranium Mill Tailings Project
Shiprock, New Mexico

Total Estimated Cost (TEC): $[illegible]

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY [illegible] Estimate		FY [illegible] Estimate		FY [illegible] Estimate		Total Cost
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Operating expenses (DOE):							
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ [illegible]
Research and development	0	0	0	0	0	0	[illegible]
Facility operations	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Direct project related support costs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Non-DOE funding:							
State share	0	0	0	0	0	0	0
Total Project funding	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]

Shiprock Uranium Mill Tailings Project
Shiprock, New Mexico

Total Estimated Cost (TEC): $23,700,000

[Tabular dollars in thousands. Narrative material in whole dollars.]

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Northwestern corner of New Mexico, on Navajo Nation land, one mile south-southwest of the town of Shiprock, New Mexico, on the south side of the San Juan River.

Site Description:

The site is in a valley formed by the San Juan River. The tailings site is approximately 75 feet above the river on a bench which drops sharply to the flood plain. From 1954 to 1968 approximately 1.5 million tons of uranium ore were processed at the mill site.

The site consists of 230 acres. The tailings are in two piles, covering 72 acres in depths up to 40 feet. Other areas of the site have been decontaminated. The tailings piles have been partially stabilized by covering with up to 2 feet of rocky soil.

Shiprock Uranium Mill Tailings Project
Shiprock, New Mexico

Total Estimated Cost (TEC): $23,798,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Shiprock site:

Activity	Start	Complete
Environmental Document	07/81	04/84
Conceptual Design	03/83	06/84
Final Design	05/84	08/85
Vicinity Property Remedial Action	08/84	06/86
Processing Site Remedial Action	10/84	02/87
Surveillance and Maintenance	03/87	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistant Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

An Environmental Assessment with finding of no significant impact (FONSI) was completed. Processing site engineering was completed and remedial action initiated. Engineering and remedial action were completed on 14 vicinity properties.

FY 1986

Complete vicinity property and 90 percent of processing site remedial action.

Shiprock Uranium Mill Tailings Project
Shiprock, New Mexico

Total Estimated Cost (TEC): $23,798,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(d) Current Year Achievements (FY 1987)

Complete remainder of processing site remedial action. Complete site certification and licensing by NRC and initiate surveillance and maintenance activities.

(e) Reasons for Increases and Decreases

Reasons for increase from the FY 1986 Budget Operating Expense Funded Data Sheet (TEC=$18,399,000) are as follows:

(1) Refined estimate including the cost of royalty payments for cover material from a Navajo Reservation source: $3,624,000
(2) Increased cost for additional hydrology work on flood plain and increased audits: $703,000
(3) Increased cost for surveillance and maintenance: $123,000
(4) An increase in estimated management support costs: $949,000

(f) Cost Estimate

The costs shown include design and construction, research and development, facility operations, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Shiprock, New Mexico.

	Total Cost
Design and construction	$ 16,544
Research and Development	3,640
Facility Operations	315
Direct Project Related Support Costs	3,299
Total DOE Cost	23,798
Non-DOE Costs	0
Total Estimated Cost	$ 23,798

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Durango Uranium Mill Tailings Project
Durango, Colorado

Total Estimated Cost (TEC): $52,579,000

Durango Uranium Mill Tailings Project
Durango, Colorado

Total Estimated Cost (TEC): $52,579,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 393	$ 938	$ 938	$ 938	$ 2,075	$ 2,075	$ 15,203	$ 15,203
Research and development	2,877	1,834	1,834	1,834	337	337	149	149
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	1,325	476	476	476	197	197	678	678
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	4,595	3,248	3,248	3,248	2,609	2,609	16,030	16,030
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	4,595	3,248	3,248	3,248	2,609	2,609	16,030	16,030
Non-DOE funding:								
State share	(39)	(94)	(94)	(94)	(207)	(207)	(1,520)	(1,520)
Total Project funding	$ 4,556	$ 3,154	$ 3,154	$ 3,154	$ 2,402	$ 2,402	$ 14,510	$ 14,510

Durango Uranium Mill Tailings Project
Durango, Colorado

Total Estimated Cost (TEC): $52,579,000

[Tabular dollars in thousands. Narrative material in whole dollars.]

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 17,767	$ 17,767	$ 10,313	$ 10,313	$ 0	$ 0
Research and development	273	273	172	172	146	146
Facility operations	0	0	22	22	85	85
Direct project related support costs	351	351	417	417	432	432
Capital equipment	0	0	0	0	0	0
Total operating expenses	18,391	18,391	10,924	10,924	663	663
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	18,391	18,391	10,924	10,924	663	663
Non-DOE funding:						
State share	(1,777)	(1,777)	(1,031)	(1,031)	0	0
Total Project Funding	$ 16,614	$ 16,614	$ 9,893	$ 9,893	$ 663	$ 663

Durango Uranium Mill Tailings Project
Durango, Colorado

Total Estimated Cost (TEC): [illegible]

(Tabular dollars in thousands. Narrative material in whole dollars.)

	[illegible]		[illegible]		[illegible]		[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Operating expenses (DOE):							
Design and construction	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	[illegible]
Research and development	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Facility operations	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Direct program related support costs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other DOE funding	0	0	0	0	0	0	0
Total DOE funding	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Non-DOE funding:							
State share	0	0	0	0	0	0	[illegible]
Total Project funding	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]

Durango Uranium Mill Tailings Project
Durango, Colorado

Total Estimated Cost (TEC): $52,579,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Southwest side of Durango, Colorado, on the west bank of the Animas River.

Site Description

The site is located on a bench of old smelter slag and alluvium about 35 feet above the normal water surface of the Animas River. The bench slopes gently up from the river for about 500 feet where it merges with the steep face of Smelter Mountain.

The total site stretches along the river for about 1 mile and covers about 126 acres. The partially stabilized tailings cover about 14 acres, the adjacent mill site about 11 acres. The raffinate pond area at the south end of the site covers about 45 acres. The tailings contain approximately 1.6 million tons of material in two piles. The larger one is 230 feet high and covers about 9 acres.

The smaller pile is about 90 feet and covers about 5 acres. Both piles are deposited against the flanks of Smelter Mountain and have steep side slopes averaging about 1.7:1. The tailings are partially stabilized with about 1 foot of cover on the top and vegetation on the slopes. The original mill buildings have been removed except for the 200 foot chimney, a small office building, and some sheds. The original concrete foundations remain. An area of approximately 40 acres surrounding the pile, primarily north and east, is contaminated with windblown tailings.

Durango Uranium Mill Tailings Project
Durango, Colorado

Total Estimated Cost (TEC): $52,579,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Durango site:

Activity	Start	Complete
Environmental Document	06/81	12/85
Conceptual Design	10/83	12/85
Final Design	07/85	09/86
Vicinity Property Remedial Action	07/84	10/88
Processing Site Remedial Action	04/87	08/89
Surveillance and Maintenance	09/89	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistant Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, maintenance and surveillance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

Initiated processing site engineering.

FY 1986

Complete environmental impact statement, issue Record of Decision and complete processing site engineering. Complete vicinity property remedial action on 25 properties.

Durango Uranium Mill Tailings Project
Durango, Colorado

Total Estimated Cost (TEC): $52,579,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(d) Current Year Achievements (FY 1987)

Complete remedial action on 45 vicinity properties and initiate processing site remedial action.

(e) Reasons for Increase and Decreases

Reasons for increase from the FY 1986 Budget Operating Expense funded Data Sheet (TEC = $43,365,000) are as follows:

(1) A refined estimate including additional quantities and required haul road: $6,999,000
(2) An increase in the estimated costs for site acquisition, audits, and data collection: $1,649,000
(3) A decrease in the estimated period for surveillance and maintenance: ($108,000)
(4) An increase in the estimated management support costs: $1,159,000
(5) An increase in state-share payments due to the TEC increase: ($485,000)

(f) Cost Estimates

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Durango, Colorado.

	Total Cost
Design and construction	$ 46,689
Research and development	5,788
Facility operations	209
Direct project related support costs	4,561
Total DOE Cost	57,247
Non-DOE Costs	(4,668)
Total Estimated Cost	$ 52,579

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Gunnison Uranium Mill Tailings Project
Gunnison, Colorado

Total Estimated Cost (TEC): $32,061,000

Gunnison Uranium Mill Tailings Project
Gunnison, Colorado

Total Estimated Cost (TEC): $32,061,000

(Tabular Dollars in Thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 22	$ 22	$ 22	$ 0	$ 0	$ 4,353	$ 4,353
Research and development	2,151	936	936	936	909	909	189	189
Facility operations	0	2	2	2	0	0	0	0
Direct project related support costs	757	402	402	402	617	617	255	255
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	2,908	1,362	1,362	1,362	1,526	1,526	4,797	4,797
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	2,908	1,362	1,362	1,362	1,526	1,526	4,797	4,797
Non-DOE funding:								
State share	0	(2)	(2)	(2)	0	0	(435)	(435)
Total Project Funding:	$ 2,908	$ 1,360	$ 1,360	$ 1,360	$ 1,526	$ 1,526	$ 4,362	$ 4,362

Gunnison Uranium Mill Tailings Project
Gunnison, Colorado

Total Estimated Cost (TEC): $32,061,000

(Tabular Dollars in Thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 9,224	$ 9,224	$ 6,484	$ 6,484	$ 0	$ 0
Research and development	208	208	172	172	146	146
Facility operations	0	0	0	0	108	108
Direct project related support costs	3,416	3,416	2,342	2,342	478	478
Capital equipment	0	0	0	0	0	0
Total operating expenses	12,848	12,848	8,998	8,998	732	732
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	12,848	12,848	8,998	8,998	732	732
Non-DOE funding:						
State share	(922)	(922)	(648)	(648)	0	0
Total Project funding	$ 11,926	$ 11,926	$ 8,350	$ 8,350	$ 732	$ 732

Gunnison Uranium Mill Tailings Project
Gunnison, Colorado

Total Estimated Cost (TEC): $32,061,000

(Tabular Dollars in Thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 20,083
Research and development	0	0	0	0	0	0	4,711
Facility operations	83	83	35	35	37	37	265
Direct project related support costs	284	284	222	222	236	236	9,009
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	367	367	257	257	273	273	34,068
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	367	367	257	257	273	273	34,068
Non-DOE funding:							
State share	0	0	0	0	0	0	(2,007)
Total Project funding	$ 367	$ 367	$ 257	$ 257	$ 273	$ 273	$ 32,061

Gunnison Uranium Mill Tailings Project
Gunnison, Colorado

Total Estimated Cost (TEC): $32,061,000

(Tabular Dollars in Thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Southwest side of Gunnison, Colorado.

Site Description:

The site is located on alluvium about 0.3 miles from the Gunnison River, 0.3 miles from Tomichi Creek, and about 1.5 miles upstream from their confluence. The total site consists of approximately 61.5 acres, the tailings cover about 35 acres, the mill site and ore storage area covers about 20 acres. The site is surrounded with residential and commercial properties.

Of the original mill structures, the main mill building, water tower, and office remain. The tailings have been partially stabilized with about 6 inches of cover and vegetation. During the period 1958-1962 approximately 540,000 tons of ore were processed at the mill site.

Gunnison Uranium Mill Tailings Project
Gunnison, Colorado

Total Estimated Cost (TEC): $32,061,000

(Tabular Dollars in Thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Gunnison site:

Activity	Start	Complete
Environmental Document	04/82	04/87
Conceptual Design	11/82	05/87
Final Design	11/86	11/87
Vicinity Property Remedial Action	04/88	09/88
Processing Site Remedial Action	08/87	09/89
Surveillance and Maintenance	10/89	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and maintenance and surveillance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

Continued preparation of environmental assessment and conceptual design.

FY 1986

Continue preparation of environmental assessment and conceptual design.

Gunnison Uranium Mill Tailings Project
Gunnison, Colorado

Total Estimated Cost (TEC): $32,061,000

(Tabular Dollars in Thousands. Narrative material in whole dollars.)

(d) Current Year Achievements (FY 1987)

Complete environmental assessment, processing site engineering, and initiate processing site remedial action.

(e) Reasons for Increases and Decreases

Reasons for the increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $16,657,000) are as follows:

(1) Estimate refinement and extended schedule: $6,281,000
(2) An increase in the cost of data acquisition for alternate sites and site selection: $2,263,000
(3) A decrease in the estimated cost of surveillance and maintenance: ($52,000)
(4) An increase in the estimated management support and contingency estimates: $7,451,000
(5) An increase in state-share payments due to the TEC increase: ($539,000)

(f) Cost Estimate

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Gunnison, Colorado.

	Total Cost
Design and construction	$ 20,083
Research and development	4,711
Facility operations	265
Direct project related support costs	9,009
Total DOE cost	34,068
Non-DOE cost	(2,007)
Total Estimated Cost	$ 32,061

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Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Grand Junction Uranium Mill Tailings Project
Grand Junction, Colorado

Total Estimated Cost (TEC): $277,749,000

Grand Junction Uranium Mill Tailings Project
Grand Junction, Colorado

Total Estimated Cost (TEC): $277,749,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 3,186	$ 3,786	$ 3,786	$ 3,786	$ 12,177	$ 12,177	$ 33,562	$ 33,562
Research and development	1,964	4,534	4,534	4,534	6,760	6,760	8,781	8,781
Facility operations	0	2	2	2	0	0	0	0
Direct project related support cost	2,012	486	486	486	1,263	1,263	4,612	4,612
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	7,162	8,808	8,808	8,808	20,200	20,200	46,955	46,955
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	7,162	8,808	8,808	8,808	20,200	20,200	46,955	46,955
Non-DOE funding:								
State share	(319)	(378)	(378)	(378)	(1,219)	(1,219)	(3,359)	(3,359)
Total Project funding	$ 6,843	$ 8,430	$ 8,430	$ 8,430	$ 18,981	$ 18,981	$ 43,596	$ 43,596

Grand Junction Uranium Mill Tailings Project
Grand Junction, Colorado

Total Estimated Cost (TEC): $277,749,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 52,840	$ 52,840	$ 54,476	$ 54,476	$ 58,456	$ 58,456
Research and development	2,246	2,246	294	294	285	285
Facility operations	0	0	0	0	0	0
Direct project related support costs	4,441	4,441	2,389	2,389	699	699
Capital equipment	0	0	0	0	0	0
Total operating expenses	59,527	59,527	57,159	57,159	59,440	59,440
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	59,527	59,527	57,159	57,159	59,440	59,440
Non-DOE funding:						
State share	(5,285)	(5,285)	(5,449)	(5,449)	(5,846)	(5,846)
Total Project funding	$ 54,242	$ 54,242	$ 51,710	$ 51,710	$ 53,594	$ 53,594

Grand Junction Uranium Mill Tailings Project
Grand Junction, Colorado

Total Estimated Cost (TEC): $277,749,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 41,360	$ 41,360	$ 1,232	$ 1,232	$ 0	$ 0	$261,075
Research and development	288	288	156	156	0	0	25,308
Facility operations	0	0	19	19	36	36	57
Direct project related support costs	713	713	395	395	413	413	17,423
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	42,361	42,361	1,802	1,802	449	449	303,863
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	42,361	42,361	1,802	1,802	449	449	303,863
Non-DOE funding:							
State share	(4,136)	(4,136)	(123)	(123)	0	0	(26,114)
Total Project funding:	$ 38,225	$ 38,225	$ 1,679	$ 1,679	$ 449	$ 449	$277,749

Grand Junction Uranium Mill Tailings Project
Grand Junction, Colorado

Total Estimated Cost (TEC): $277,749,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

South side of Grand Junction, Colorado, on the north bank of the Colorado River near its junction with the Gunnison River; adjacent to the industrial center of the city.

Site Description

The site is located on an alluvial flood plain and is surrounded by industrial developments. The total designated site covers about 105 acres. The tailings cover about 60 acres, the mill site and ore storage covers about 5 acres, and the remaining 40-acre area is the state-owned depository for the Grand Junction Remedial Action Project. There are approximately 1.9 million tons of tailings on the site which have been stabilized with a 6-inch dirt cover. Most of the original mill buildings and other structures have been removed. During the period 1951-1970 approximately 2.2 million tons of uranium ore were processed at the mill site.

Grand Junction Uranium Mill Tailings Project
Grand Junction, Colorado

Total Estimated Cost (TEC): $277,749,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Grand Junction site:

Activity	Start	Complete
Environmental Document	04/82	08/86
Conceptual Design	01/85	09/86
Final Design	04/86	05/87
Vicinity Property Remedial Action	08/83	09/91
Processing Site Remedial Action	06/87	12/91
Surveillance and Maintenance	01/92	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

Initiated processing site environmental impact statement and conceptual design. Completed 56 vicinity property remedial actions.

Grand Junction Uranium Mill Tailings Project
Grand Junction, Colorado

Total Estimated Cost (TEC): $277,749,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

FY 1986

Complete 160 vicinity properties remedial action. Complete environmental impact statement, issue Record of Decision, and initiate processing site engineering.

(d) Current Year Achievements (FY 1987)

Complete remedial actions at approximately 800 vicinity properties. Complete processing site engineering and initiate remedial action.

(e) Reasons for Increases and Decreases

Reasons for the increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $185,045,000) are as follows:

(1) An increase in costs due to refinement of processing site and improved vicinity property cost estimates: $87,970,0000
(2) An increase in the cost of site characterization, data acquisition, etc., to support relocation: $7,050,000
(3) A decrease in estimated cost for surveillance and maintenance: ($12,000)
(4) An increase in the estimated management support costs: $5,596,000
(5) Increased state-share payments in relation to the TEC increase: ($7,900,000)

Grand Junction Uranium Mill Tailings Project
Grand Junction, Colorado

Total Estimated Cost (TEC): $277,749,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimate

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Grand Junction, Colorado.

	Total Cost
Design and construction	$261,075
Research and development	25,308
Facility operations	57
Direct project related support costs	17,423
Total DOE Cost	303,135
Non-DOE Costs	(26,114)
Total Estimated Cost	$277,749

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(Tabular dollars in thousands. Narrative material in whole dollars.)

Rifle Uranium Mill Tailings Project
Rifle, Colorado

Total Estimated Cost (TEC): $57,914,000

Rifle Uranium Mill Tailings Project
Rifle, Colorado

Total Estimated Cost (TEC): $57,914,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 994	$ 994
Research and development	1,508	1,105	1,105	1,105	1,242	1,242	674	674
Facility operations	0	2	2	2	0	0	0	0
Direct project related support cost	562	367	367	367	543	543	431	431
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	2,070	1,474	1,474	1,474	1,785	1,785	2,099	2,099
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	2,070	1,474	1,474	1,474	1,785	1,785	2,099	2,099
Non-DOE funding:								
State Share	0	0	0	0	0	0	(99)	(99)
Total Project funding	$ 2,070	$ 1,474	$ 1,474	$ 1,474	$ 1,785	$ 1,785	$ 2,000	$ 2,000

Rifle Uranium Mill Tailings Project
Rifle, Colorado

Total Estimated Cost (TEC): $57,914,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 10,503	$ 10,503	$ 22,141	$ 22,141	$ 14,761	$ 14,761
Research and development	451	451	230	230	199	199
Facility operations	0	0	0	0	0	0
Direct project related support costs	447	447	461	461	426	426
Capital equipment	0	0	0	0	0	0
Total operating expenses	11,401	11,401	22,832	22,832	15,386	15,386
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	11,401	11,401	22,832	22,832	15,386	15,386
Non-DOE funding:						
State share	(1,050)	(1,050)	(2,214)	(2,214)	(1,476)	(1,476)
Total Project funding	$ 10,351	$ 10,351	$ 20,618	$ 20,618	$ 13,910	$ 13,910

Rifle Uranium Mill Tailings Project
Rifle, Colorado

Total Estimated Cost (TEC): $57,914,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 4,945	$ 4,945	$ 0	$ 0	$ 0	$ 0	$53,344
Research and development	156	156	0	0	0	0	5,565
Facility operations	52	52	70	70	74	74	198
Direct project related support costs	479	479	206	206	219	219	4,141
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	5,632	5,632	276	276	293	293	63,248
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	5,632	5,632	276	276	293	293	63,248
Non-DOE funding:							
State share	(495)	(495)	0	0	0	0	(5,334)
Total Project funding:	$ 5,137	$ 5,137	$ 276	$ 276	$ 293	$ 293	$ 57,914

Rifle Uranium Mill Tailings Project
Rifle, Colorado

Total Estimated Cost (TEC): $57,914,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Northwest Colorado, approximately 60 miles east of Grand Junction, on the Colorado River. Old Rifle site is just east-southeast of the city of Rifle; New Rifle site is 1-1/2 miles west-southwest of the city.

Site Description

The New Rifle site is located on alluvium about 10 feet above the normal elevation of the Colorado River. The total site covers about 300 acres. The tailings cover about 32 acres on the west half of the site. There are approximately 2.7 million tons of tailings in a two-tiered pile that is about 70 feet high and has side slopes approaching 1:1 at many points. The tailings were stabilized with mulch, fertilized, and vegetated. The mill remains in standby condition and may not be moved. From 1958-1972 approximately 2.7 million tons of ore were processed at the mill site.

The Old Rifle site is located in a small basin at the base of the cliff that marks the northern edge of the Colorado River floodplain. The site covers about 22 acres of which 11 acres are the mill site and the tailings pile covers the rest. During the years 1924-1932 and 1942-1958 approximately 761,000 tons of uranium ore were processed at the mill site. Approximately 400,000 tons of tailings were removed to the New Rifle site leaving approximately 350,000 tons of tailings at the Old Rifle site. The pile is separated from the Colorado River by a railroad embankment that rises about 10 feet above the base of the pile. There is only a minor amount of demolition.

There are about 20 acres of windblown contamination at the Old Rifle site and about 100 acres of windblown contamination at the New Rifle site.

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Rifle site:

Activity	Start	Complete
Environmental Document	04/82	09/87
Conceptual Design	01/85	10/87
Final Design	11/86	09/87
Vicinity Property Remedial Action	06/88	12/89
Processing Site Remedial Action	05/88	06/91
Surveillance and Maintenance	07/91	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

Rifle Uranium Mill Tailings Project
Rifle, Colorado

Total Estimated Cost (TEC): $57,914,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(c) Prior Year Achievements

FY 1985

Initiated conceptual design and continued preparation of environmental documentation.

FY 1986

Continue preparation of conceptual design and environmental documentation.

(d) Current Year Achievements (FY 1987)

Complete environmental impact statement, issue Record of Decision and complete processing site engineering. Initiate vicinity property engineering.

(e) Reasons for Increases and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $26,407,000) are as follows:

(1) An increase in processing site remedial action estimated cost due to refinement: $30,164,000
(2) An increase in the cost of site characterization and data acquisition to support relocation: $2,088,000
(3) An increase in the period for surveillance and maintenance: $97,000
(4) An increase in the estimated management support costs: $2,030,000
(5) An increase in state-share payments due to the TEC increase: ($2,872,000)

Rifle Uranium Mill Tailings Project
Rifle, Colorado

Total Estimated Cost (TEC): $57,914,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimates

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Rifle, Colorado.

	Total Cost
Design and construction	$ 53,344
Research and development	5,565
Facility operations	198
Direct project related support costs	4,141
Total DOE Cost	63,248
Non-DOE Costs	(5,334)
Total Estimated Cost	$ 57,914

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(Tabular dollars in thousands. Narrative material in whole dollars.)

Riverton Uranium Mill Tailings Project
Riverton, Wyoming

Total Estimated Cost (TEC): $34,256,000

Riverton Uranium Mill Tailings Project
Riverton, Wyoming

Total Estimated Cost (TEC): $30,256,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years Obs.	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
		B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 119	$ 1,062	$ 1,062	$ 1,062	$ 108	$ 108	$ 2,586	$ 2,586
Research and development	2,125	663	663	663	33	33	146	146
Facility operations	0	4	4	4	0	0	0	0
Direct project related support cost	837	407	407	407	121	121	420	420
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	3,081	2,136	2,136	2,136	262	262	3,152	3,152
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	3,081	2,136	2,136	2,136	262	262	3,152	3,152
Non-DOE funding:								
State share	(12)	(106)	(106)	(106)	(19)	(19)	(290)	(290)
Total Project funding	$ 3,069	$ 2,030	$ 2,030	$ 2,030	$ 243	$ 243	$ 2,862	$ 2,862

Riverton Uranium Mill Tailings Project
Riverton, Wyoming

Total Estimated Cost (TEC): $34,256,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 10,246	$ 10,246	$ 6,811	$ 6,811	$ 0	$ 0
Research and development	192	192	174	174	138	138
Facility operations	0	0	0	0	108	108
Direct project related support costs	5,640	5,640	2,962	2,962	479	479
Capital equipment	0	0	0	0	0	0
Total operating expenses	16,078	16,078	9,947	9,947	725	725
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	16,078	16,078	9,947	9,947	725	725
Non-DOE funding:						
State share	(1,025)	(1,025)	(681)	(681)	0	0
Total Project funding	$ 15,053	$ 15,053	$ 9,266	$ 9,266	$ 725	$ 725

Riverton Uranium Mill Tailings Project
Riverton, Wyoming

Total Estimated Cost (TEC): $34,256,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 21,023
Research and development	0	0	0	0	0	0	3,471
Facility operations	84	84	35	35	37	37	268
Direct project related support costs	284	284	222	222	236	236	11,597
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	368	368	257	257	273	273	36,359
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	368	368	257	257	273	273	36,359
Non-DOE funding:							
State share	0	0	0	0	0	0	(2,103)
Total Project funding:	$ 368	$ 368	$ 257	$ 257	$ 273	$ 273	$ 34,256

Riverton Uranium Mill Tailings Project
Riverton, Wyoming

Total Estimated Cost (TEC): $34,256,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

West central Wyoming, approximately 120 miles southeast of Teton National Park, and 2 miles southwest of Riverton, Wyoming.

Site Description

The site is within the Wind River Indian Reservation, but is privately owned. The original sulfuric acid plant is still in operation. Between 1958 and 1963 approximately 900,000 tons of ore were processed at the mill site.

Riverton Uranium Mill Tailings Project
Riverton, Wyoming

Total Estimated Cost (TEC): $34,256,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

The total site covers 173 acres of which 72 acres are covered with tailings, 19 acres are the old mill, 65 acres are contaminated with windblown tailings, and 17 acres are uncontaminated land. Portions of the mill structure have been removed. The partially stabilized tailings exist in a relatively confined area of 72 acres. The site is situated between the Wind River and the Little Wind River approximately 1 mile from their confluence.

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Riverton site:

Activity	Start	Complete
Environmental Document	11/81	03/86
Conceptual Design	10/82	03/86
Final Design	10/85	07/87
Vicinity Property Remedial Action	06/85	08/88
Processing Site Remedial Action	09/87	09/89
Surveillance and Maintenance	10/89	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

Riverton Uranium Mill Tailings Project
Riverton, Wyoming

Total Estimated Cost (TEC): $34,256,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(c) Prior Year Achievements

FY 1985

Initiated environmental assessment and processing design and completed remedial action on 13 vicinity properties.

FY 1986

Complete environmental assessment and continue processing site engineering.

(d) Current Year Achievements (FY 1987)

Complete processing site engineering and initiate processing site remedial action.

(e) Reasons for Increase and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $20,360,000) are as follows:

(1) Refinement of the construction estimate: $3,435,000
(2) An increase in the cost of data acquisition and NEPA documentation: $1,288,000
(3) A reduction in the cost for surveillance and maintenance: ($173,000)
(4) An increase in the estimated management support and contingency cost estimates: $9,597.000
(5) An increase in state-share payments due to the TEC increase: ($251,000)

Riverton Uranium Mill Tailings Project
Riverton, Wyoming

Total Estimated Cost (TEC): $34,256,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimates

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Riverton, Wyoming.

	Total Cost
Design and construction	$ 21,023
Research and development	3,471
Facility operations	268
Direct project related support costs	11,597
Total DOE Cost	36,359
Non-DOE Costs	(2,103)
Total Estimated Cost	$ 34,256

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
NUCLEAR ENERGY

Energy Supply Research and Development
Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Tuba City Uranium Mill Tailings Project
Tuba City, Arizona

Total Estimated Cost (TEC): [illegible]

Tuba City Uranium Mill Tailings Project
Tuba City, Arizona

Total Estimated Cost (TEC): $18,381,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 13	$ 166	$ 166	$ 166	$ 1,201	$ 1,201	$ 1,340	$ 1,340
Research and development	1,279	1,044	1,044	1,044	455	455	156	156
Facility operations	0	2	2	2	0	0	0	0
Direct project related support cost	463	425	425	425	309	309	2,694	2,694
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,755	1,637	1,637	1,637	1,965	1,965	4,190	4,190
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,755	1,637	1,637	1,637	1,965	1,965	4,190	4,190
Non-DOE funding:								
State share	0	0	0	0	0	0	0	0
Total Project Funding	$ 1,755	$ 1,637	$ 1,637	$ 1,637	$ 1,965	$ 1,965	$ 4,190	$ 4,190

Tuba City Uranium Mill Tailings Project
Tuba City, Arizona

Total Estimated Cost (TEC): $18,381,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 4,341	$ 4,341	$ 1,530	$ 1,530	$ 0	$ 0
Research and development	172	172	163	163	133	133
Facility operations	0	0	16	16	85	85
Direct project related support costs	759	759	415	415	432	432
Capital equipment	0	0	0	0	0	0
Total operating expenses	5,272	5,272	2,124	2,124	650	650
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	5,272	5,272	2,124	2,124	650	650
Non-DOE funding:						
State share	0	0	0	0	0	0
Total Project funding	$ 5,272	$ 5,272	$ 2,124	$ 2,124	$ 650	$ 650

Tuba City Uranium Mill Tailings Project
Tuba City, Arizona

Total Estimated Cost (TEC): $18,381,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 8,591
Research and development	0	0	0	0	0	0	3,402
Facility operations	74	74	28	28	0	0	205
Direct project related support costs	282	282	196	196	208	208	6,183
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	356	356	224	224	208	208	18,381
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	356	356	224	224	208	208	18,381
Non-DOE funding:							
State Share	0	0	0	0	0	0	0
Total Project funding:	$ 356	$ 356	$ 224	$ 224	$ 208	$ 208	$ 18,381

Tuba City Uranium Mill Tailings Project
Tuba City, Arizona

Total Estimated Cost (TEC): $18,381,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished.

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

North central Arizona, on Navajo Nation land, 5-1/2 miles east of Tuba City, Coconina County, and 85 miles north of Flagstaff.

Site Description

The site is located on gently sloping terrain approximately 2 miles north of the Moenkopi Wash. The total site consists of approximately 105 acres, of which the mill site occupies approximately 30 acres, and emergency dump ponds occupy 20 acres. The mill building, two other structures, and numerous foundations remain on the site. A mill camp consisting of 26 homes, some of which are still occupied, is adjacent to the site. A large surrounding area (304 acres) is contaminated with windblown tailings.

Tuba City Uranium Mill Tailings Project
Tuba City, Arizona

Total Estimated Cost (TEC): $18,381,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Tuba City site:

Activity	Start	Complete
Environmental Document	06/81	04/86
Conceptual Design	03/83	08/86
Final Design	08/85	04/86
Vicinity Property Remedial Action	05/87	07/87
Processing Site Remedial Action	12/85	08/89
Surveillance and Maintenance	09/89	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

Continued preparation of environmental assessment, processing site engineering, and conceptual design.

FY 1986

Complete environmental assessment and processing site engineering, and initiate remedial action.

Tuba City Uranium Mill Tailings Project
Tuba City, Arizona

Total Estimated Cost (TEC): $18,381,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(d) Current Year Achievements (FY 1987)

Complete 30 percent of processing site and 100 percent of vicinity property remedial action.

(e) Reasons for Increase and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $15,418,000) are as follows:

(1) A reduction in stabilization-in-place construction cost based on estimate refinement: ($3,604,000)
(2) An increase in the cost of data acquisition, site acquisition, and site characterization: $1,426,000
(3) An increase in the period for surveillance and maintenance due to schedule extension: $79,000
(4) An increase in the estimated management support and contingency cost estimates: $5,062,000

(f) Cost Estimates

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Tuba City, Arizona.

	Total Cost
Design and construction	$ 8,591
Research and development	3,402
Facility operations	205
Direct project related support costs	6,183
Total DOE Cost	18,381
Non-DOE Costs	0
Total Estimated Cost	$ 18,381

DEPARTMENT OF ENERGY
FY 1987 [illegible]
[illegible]
[illegible]

Energy Supply, Research and Development
Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Mexican Hat Uranium Mill Tailings Project
Mexican Hat, Utah

Total Estimated Cost (TEC): [illegible]

Mexican Hat Uranium Mill Tailings Project
Mexican Hat, Utah

Total Estimated Cost (TEC): $30,668,000

[Tabular dollars in thousands. Narrative material in whole dollars.]

	Cumulative Prior Years Obs.	FY 1985 Estimate B/A	FY 1985 Estimate Obs.	FY 1985 Estimate B/O	FY 1986 Estimate B/A	FY 1986 Estimate B/O	FY 1987 Estimate B/A	FY 1987 Estimate B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 183	$ 183	$ 183	$ 546	$ 546	$ 2,806	$ 2,806
Research and development	1,329	790	790	790	775	775	211	211
Facility operations	0	0	0	0	0	0	0	0
Direct project related support costs	475	367	367	367	522	522	290	290
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,804	1,340	1,340	1,340	1,843	1,843	3,307	3,307
Other DOE funding	0	0	0	0	0	0	0	0
Total DOE funding	1,804	1,340	1,340	1,340	1,843	1,843	3,307	3,307
Non-DOE funding: State share	0	0	0	0	0	0	0	0
Total Project Funding	$ 1,804	$ 1,340	$ 1,340	$ 1,340	$ 1,843	$ 1,843	$ 3,307	$ 3,307

Mexican Hat Uranium Mill Tailings Project
Mexican Hat, Utah

Total Estimated Cost (TEC): $30,668,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 10,789	$ 10,789	$ 8,053	$ 8,053	$ 0	$ 0
Research and development	223	223	221	221	135	135
Facility operations	0	0	0	0	88	88
Direct project related support costs	448	448	641	641	432	432
Capital equipment	0	0	0	0	0	0
Total operating expenses	11,460	11,460	8,915	8,915	655	655
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	11,460	11,460	8,915	8,915	655	655
Non-DOE funding:						
State share	0	0	0	0	0	0
Total Project Funding	$ 11,460	$ 11,460	$ 8,915	$ 8,915	$ 655	$ 655

Mexican Hat Uranium Mill Tailings Project
Mexican Hat, Utah

Total Estimated Cost (TEC): $30,668,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 22,577
Research and development	0	0	0	0	0	0	3,684
Facility operations	95	95	100	100	126	126	409
Direct project related support costs	362	362	224	224	237	237	3,998
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	457	457	324	324	363	363	30,668
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	457	457	324	324	363	363	30,668
Non-DOE funding:							
State share	0	0	0	0	0	0	0
Total Project funding:	$ 457	$ 457	$ 324	$ 324	$ 363	$ 363	$ 30,668

Mexican Hat Uranium Mill Tailing Project
Mexican Hat, Utah

Total Estimated Cost (TEC): $30,668,000

(Tabular dollar in thousands. Narrative material in whole dollars.)

Description, Objective and Justiication

The Uranium Mill Tailings Radiaton Control Act of 1978, public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authoizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium procssing sites and associated vicinity properties.

The purpose of the remedial actins is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Prsuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participaion of the affected states and Indian tribes.
- In accordance with stanerds issued by the Environmental Protection Agency (EPA).
- With the concurrence ofthe Nuclear Regultory Commission (NRC).

Location:

Southeast Utah, on Navajo Nation land (tract now known as "Halchita") 1.5 miles southwest of Mexican Hat, Utah.

Site Description

The site is located on gently sloping land about 1 mile south of the San Juan River. The total site consists of 173 acres. The tailings, located in two piles, cover about 68 acres; the mill site covers 15 acres and approximately 9 on-site acres are contaminated with windblown tailings. The tailings consist of about 1.7 milliorcy (2.2 million tons). The tailings are not stabilized. Some of the existing structures have bee decontaminated and are in use. Between 1957 and 1965 approximately 5,700 tons of uranium concerrate were produced from the 2.2 million tons of ore processed as the mill site.

Mexican Hat Uranium Mill Tailings Project
Mexican Hat, Utah

Total Estimated Cost (TEC): $30,668,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Mexican Hat site:

Activity	Start	Complete
Environmental Document	06/81	09/86
Conceptual Design	01/83	01/87
Final Design	09/85	06/87
Vicinity Property Remedial Action	10/87	09/88
Processing Site Remedial Action	07/87	09/89
Surveillance and Maintenance	10/89	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

Continued preparation of environmental assessment, processing site engineering and conceptual design.

FY 1986

Complete environmental assessment and processing site engineering.

Mexican Hat Uranium Mill Tailings Project
Mexican Hat, Utah

Total Estimated Cost (TEC): $30,000,000

[Tabular dollars in thousands. Narrative material in whole dollars.]

(d) Current Year Achievements (FY 1987)

Initiate processing site remedial action.

(e) Reasons for Increase and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $19,058,000) are as follows:

(1) An increase due to refined estimate and cover material cost increases: $6,017,000
(2) An increase in the cost of data acquisition, audit and NEPA costs based on experience to date: $1,718,000
(3) An increase in the cost for surveillance and maintenance: $263,000
(4) An increase in the estimated management support costs: $2,762,000

(f) Cost Estimates

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Mexican Hat, Utah.

	Total Cost
Design and construction	$ 22,377
Research and development	3,600
Facility operations	400
Direct project related support costs	3,623
Total DOE Cost	30,000
Non-DOE Costs	0
Total Estimated Cost	$ 30,000

DEPARTMENT OF ENERGY
FY [illegible] CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
[illegible]

Energy Supply Research and Development
Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Lakeview Uranium Mill Tailings Project
Lakeview, Oregon

Total Estimated Cost (TEC): [illegible]

Lakeview Uranium Mill Tailings Project
Lakeview, Oregon

Total Estimated Cost (TEC): $20,435,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 296	$ 296	$ 296	$ 5,734	$ 5,734	$ 9,104	$ 9,104
Research and development	1,423	926	926	926	134	134	156	156
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	526	447	447	447	120	120	195	195
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,949	1,669	1,669	1,669	5,988	5,988	9,455	9,455
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,949	1,669	1,669	1,669	5,988	5,988	9,455	9,455
Non-DOE funding:								
State share	0	(30)	(30)	(30)	(573)	(573)	(910)	(910)
Total Project funding	$ 1,949	$ 1,639	$ 1,639	$ 1,639	$ 5,415	$ 5,415	$ 8,545	$ 8,545

Lakeview Uranium Mill Tailings Project
Lakeview, Oregon

Total Estimated Cost (TEC): $20,435,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 728	$ 728	$ 0	$ 0	$ 0	$ 0
Research and development	173	173	108	108	0	0
Facility operations	17	17	99	99	51	51
Direct project related support costs	350	350	422	422	205	205
Capital equipment	0	0	0	0	0	0
Total operating expenses	1,268	1,268	629	629	256	256
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	1,268	1,268	629	629	256	256
Non-DOE funding:						
State share	(73)	(73)	0	0	0	0
Total Project funding	$ 1,195	$ 1,195	$ 629	$ 629	$ 256	$ 256

Lakeview Uranium Mill Tailings Project
Lakeview, Oregon

Total Estimated Cost (TEC): $20,435,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 15,862
Research and development	0	0	0	0	0	0	2,920
Facility operations	74	74	41	41	0	0	282
Direct project related support costs	282	282	199	199	211	211	2,957
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	356	356	240	240	211	211	22,021
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	356	356	240	240	211	211	22,021
Non-DOE funding:							
Share funding	0	0	0	0	0	0	(1,586)
Total Project funding:	$ 356	$ 356	$ 240	$ 240	$ 211	$ 211	$ 20,435

Lakeview Uranium Mill Tailings Project
Lakeview, Oregon

Total Estimated Cost (TEC): $20,435,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished.

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Ninety-six miles east of Klamath Falls, in south-central Oregon, 16 miles north of the Oregon-California border.

Site Description

The site is located on a relatively level terrain. The total site consists of 258 acres. The tailings cover 30 acres, evaporation ponds cover 64 acres and 8 acres of the site are contaminated with windblown tailings. Only 130,000 tons of ore were processed at the site from 1958 and 1968. The on-site structures and mill site areas have been decontaminated and are in use. Only minor contamination remains on the site. The tailings have been stabilized.

Lakeview Uranium Mill Tailings Project
Lakeview, Oregon

Total Estimated Cost (TEC): $20,435,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Lakeview site:

Activity	Start	Complete
Environmental Document	07/82	12/85
Conceptual Design	05/84	12/85
Final Design	03/85	05/86
Vicinity Property Remedial Action	04/87	09/87
Processing Site Remedial Action	06/86	12/87
Surveillance and Maintenance	01/88	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistant Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on the UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors. A decision has been made to relocate the tailings to a site to be determined and acquired by the State of Oregon.

(c) Prior Year Achievements

FY 1985

Continued preparation of environmental documentation and conceptual design and initiated processing site engineering.

Lakeview Uranium Mill Tailings Project
Lakeview, Oregon

Total Estimated Cost (TEC): $20,435,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

FY 1986

Complete environmental assessment and processing site engineering and initiate processing site remedial action.

(d) Current Year Achievements (FY 1987)

Complete 85 percent processing site and vicinity property remedial action.

(e) Reasons for Increase and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC=$19,476,000) are as follows:

(1) A decrease in construction costs due to refinement of estimates: ($1,751,000)
(2) An increase in data acquisition costs for alternate site evaluation: $747,000
(3) An increase in the period for surveillance and maintenance due to schedule extension: $156,000
(4) An increase in management support and contingency estimates: $1,526,000
(5) A decrease in state-share payments due to the TEC increase: $281,000

Lakeview Uranium Mill Tailings Project
Lakeview, Oregon

Total Estimated Cost (TEC): $20,435,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimates

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Lakeview, Oregon.

	Total Cost
Design and construction	$ 15,862
Research and development	2,920
Facility operations	282
Direct project related support costs	2,957
Total DOE Cost	22,021
Non-DOE Costs	(1,586)
Total Estimated Cost	$ 20,435

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NUCLEAR ENERGY

Energy Supply Research and Development
Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Ambrosia Lake Uranium Mill Tailings Project
Ambrosia Lake, New Mexico

Total Estimated Cost (TEC): $24,497,000

Ambrosia Lake Uranium Mill Tailings Project
Ambrosia Lake, New Mexico

Total Estimated Cost (TEC): $24,497,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 158	$ 158	$ 158	$ 971	$ 971	$ 3,148	$ 3,148
Research and development	947	703	703	703	450	450	151	151
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	333	347	347	347	342	342	193	193
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,280	1,208	1,208	1,208	1,763	1,763	3,492	3,492
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,280	1,208	1,208	1,208	1,763	1,763	3,492	3,492
Non-DOE funding:								
State share	0	(16)	(16)	(16)	(97)	(97)	(315)	(315)
Total Project funding	$ 1,280	$ 1,192	$ 1,192	$ 1,192	$ 1,666	$ 1,666	$ 3,177	$ 3,177

Ambrosia Lake Uranium Mill Tailings Project
Ambrosia Lake, New Mexico

Total Estimated Cost (TEC): $24,497,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 10,824	$ 10,824	$ 5,843	$ 5,804	$ 0	$ 0
Research and development	171	171	137	137	78	78
Facility operations	0	0	0	0	61	61
Direct project related support costs	303	303	373	373	387	387
Capital equipment	0	0	0	0	0	0
Total operating expenses	11,298	11,298	6,353	6,353	526	526
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	11,298	11,298	6,353	6,353	526	526
Non-DOE funding:						
State share	(1,082)	(1,082)	(584)	(584)	0	0
Total Project funding	$ 10,216	$ 10,216	$ 5,769	$ 5,769	$ 526	$ 526

Ambrosia Lake Uranium Mill Tailings Project
Ambrosia Lake, New Mexico

Total Estimated Cost (TEC): $24,497,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 20,944
Research and development	0	0	0	0	0	0	2,637
Facility operations	50	50	16	16	17	17	144
Direct project related support costs	238	238	170	170	180	180	2,866
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	288	288	186	186	197	197	26,591
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	288	288	186	186	197	197	26,591
Non-DOE funding:							
State share	0	0	0	0	0	0	(2,094)
Total Project funding:	$ 288	$ 288	$ 186	$ 186	$ 197	$ 197	$ 24,497

Ambrosia Lake Uranium Mill Tailings Project
Ambrosia Lake, New Mexico

Total Estimated Cost (TEC): $24,497,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- o With the full participation of the affected states and Indian tribes.
- o In accordance with standards issued by the Environmental Protection Agency (EPA).
- o With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Northwestern New Mexico, 20 miles north of Grants, 85 miles northwest of Albuquerque.

Site Description

The site is located on a relatively flat valley floor, and is surrounded by open lands and numerous active and inactive uranium mines and mills. From 1957 to 1963 approximately 3 million tons of ore were processed at the mill site.

The total site consists of approximately 200 acres. The tailings pile covers 105 acres, the mill site approximately 30 acres, and approximately 65 acres on the site are covered with windblown tailings. The tailings pile contains 2.5 million tons of tailings. Much of the original mill building and equipment remains intact. Approximately 330 acres of surrounding off-site terrain are contaminated with windblown tailings.

Ambrosia Lake Uranium Mill Tailings Project
Ambrosia Lake, New Mexico

Total Estimated Cost (TEC): $24,497,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Ambrosia Lake site:

Activity	Start	Complete
Environmental Document	07/81	06/86
Conceptual Design	01/85	07/86
Final Design	12/85	09/86
Vicinity Property Remedial Action	NA	NA
Processing Site Remedial Action	10/86	09/89
Surveillance and Maintenance	10/89	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistant Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

Prepared environmental assessment and site conceptual design.

FY 1986

Complete environmental assessment and complete processing site engineering.

Ambrosia Lake Uranium Mill Tailings Project
Ambrosia Lake, New Mexico

Total Estimated Cost (TEC): $24,497,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(d) Current Year Achievements (FY 1987)

Initiate processing site remedial action.

(e) Reasons for Increase and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC=$21,971,000) are as follows:

(1) An increase in construction costs due to estimate refinement and schedule extension: $106,000
(2) An increase in the cost of data acquisition and NEPA documentation based on experience to date: $836,000
(3) An increase in the estimated cost for surveillance and maintenance due to schedule extension: $54,000
(4) An increase in the estimated management support and contingency estimates: $1,402,000
(5) Decreased state-share payments in relation to the TEC increase: $128,000

(f) Cost Estimate

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Ambrosia Lake, New Mexico.

	Total Cost
Design and construction	$ 20,944
Research and development	2,637
Facility operations	144
Direct project related support costs	2,866
Total DOE Cost	26,591
Non-DOE Costs	(2,094)
Total Estimated Cost	$ 24,497

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Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Naturita Uranium Mill Tailings Project
Naturita, Colorado

Total Estimated Cost (TEC): $18,702,000

Naturita Uranium Mill Tailings Project
Naturita, Colorado

Total Estimated Cost (TEC): $18,702,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 130	$ 130
Research and development	947	646	646	646	1,406	1,406	873	873
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	333	332	332	332	895	895	1,144	1,144
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,280	978	978	978	2,301	2,301	2,147	2,147
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,280	978	978	978	2,301	2,301	2,147	2,147
Non-DOE funding:								
State share	0	0	0	0	0	0	(13)	(13)
Total Project funding	$ 1,280	$ 978	$ 978	$ 978	$ 2,301	$ 2,301	$ 2,134	$ 2,134

Naturita Uranium Mill Tailings Project
Naturita, Colorado

Total Estimated Cost (TEC): $18,702,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 315	$ 315	$ 367	$ 367	$ 3,491	$ 3,491
Research and development	320	320	153	153	180	180
Facility operations	0	0	0	0	0	0
Direct project related support costs	906	906	373	373	557	557
Capital equipment	0	0	0	0	0	0
Total operating expenses	1,541	1,541	893	893	4,228	4,228
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	1,541	1,541	893	893	4,228	4,228
Non-DOE funding:						
State share	(31)	(31)	(37)	(37)	(349)	(349)
Total Project funding	$ 1,510	$ 1,510	$ 856	$ 856	$ 3,879	$ 3,879

Naturita Uranium Mill Tailings Project
Naturita, Colorado

Total Estimated Cost (TEC): $18,702,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 4,284	$ 4,284	$ 0	$ 0	$ 0	$ 0	$ 8,587
Research and development	63	63	82	82	0	0	4,670
Facility operations	86	86	91	91	127	127	304
Direct project related support costs	485	485	473	473	501	501	5,999
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	4,918	4,918	646	646	628	628	19,560
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	4,918	4,918	646	646	628	628	19,560
Non-DOE funding:							
State share	(428)	(428)	0	0	0	0	(858)
Total Project funding:	$ 4,490	$ 4,490	$ 646	$ 646	$ 628	$ 628	$ 18,702

Naturita Uranium Mill Tailings Project
Naturita, Colorado

Total Estimated Cost (TEC): $18,702,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Two miles northwest of the town of Naturita, Colorado.

Site Description

The site is located on relatively flat, alluvial river-bottom material immediately adjacent to the San Miguel River.

The total site covers approximately 50 acres. The original tailings pile covered 23 acres and the mill site and ore storage covers approximately 14 acres. Essentially, all of the tailings have been removed for reprocessing. The site is stabilized and residual contamination is relatively minor. Numerous buildings and structures remain on the site. From 1942 to 1963 approximately 704,000 tons of ore were processed at the mill site.

Naturita Uranium Mill Tailings Project
Naturita, Colorado

Total Estimated Cost (TEC): $18,702,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Naturita site:

Activity	Start	Complete
Environmental Document	07/81	03/87
Conceptual Design	04/86	03/87
Final Design	02/87	01/88
Vicinity Property Remedial Action	04/90	06/91
Processing Site Remedial Action	04/90	06/91
Surveillance and Maintenance	07/91	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, survillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

Continued preparation of environmental assessment.

Naturita Uranium Mill Tailings Project
Naturita, Colorado

Total Estimated Cost (TEC): $18,702,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

FY 1986

Initiate conceptual design and continue preparation of environmental documentation.

(d) Current Year Achievements (FY 1987)

Complete environmental assessment, complete conceptual design and initiate processing site engineering.

(e) Reasons for Increase and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $10,445,000) are as follows:

(1) An increase in estimated construction costs due to estimate refinement and schedule extension: $292,000
(2) An increase in the cost of data acquisition and NEPA documentation, based on experience to date: $2,600,000
(3) An increase in the cost for surveillance and maintenance: $214,000
(4) An increase in the management support and contingency estimates: $5,125,000
(5) A decrease in state-share payments due to the TEC increase: $26,000

(f) Cost Estimates

The costs shown include design and construction, research and development, facility operations, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Naturita, Colorado.

Naturita Uranium Mill Tailings Project
Naturita, Colorado

Total Estimated Cost (TEC): $18,702,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Total Cost
Design and construction	$ 8,587
Research and development	4,670
Facility operations	304
Direct project related support costs	5,999
Total DOE Cost	19,560
Non-DOE Cost	(858)
Total Estimated Cost	$ 18,702

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(Tabular dollars in thousands. Narrative material in whole dollars.)

Falls City Uranium Mill Tailings Project
Falls City, Texas

Total Estimated Cost (TEC): $33,679,000

Falls City Uranium Mill Tailings Project
Falls City, Texas

Total Estimated Cost (TEC): $33,679,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 415	$ 415
Research and development	1,135	357	357	357	1,985	1,985	370	370
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	381	267	267	267	831	831	418	418
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,516	624	624	624	2,816	2,816	1,203	1,203
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,516	624	624	624	2,816	2,816	1,203	1,203
Non-DOE funding:								
State share	0	0	0	0	0	0	(41)	(41)
Total Project funding	$ 1,516	$ 624	$ 624	$ 624	$ 2,816	$ 2,816	$ 1,162	$ 1,162

Falls City Uranium Mill Tailings Project
Falls City, Texas

Total Estimated Cost (TEC): $33,679,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 3,134	$ 3,134	$ 9,109	$ 9,109	$ 10,244	$ 10,244
Research and development	209	209	163	163	132	132
Facility operations	0	0	0	0	0	0
Direct project related support costs	398	398	374	374	476	476
Capital equipment	0	0	0	0	0	0
Total operating expenses	3,741	3,741	9,646	9,646	10,852	10,852
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	3,741	3,741	9,646	9,646	10,852	10,852
Non-DOE funding:						
State share	(313)	(313)	(911)	(911)	(1,024)	(1,024)
Total Project funding	$ 3,428	$ 3,428	$ 8,735	$ 8,735	$ 9,828	$ 9,828

Falls City Uranium Mill Tailings Project
Falls City, Texas

Total Estimated Cost (TEC): $33,679,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/A	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 5,149	$ 5,149	$ 0	$ 0	$ 0	$ 0	$ 28,051
Research and development	0	0	0	0	0	0	4,351
Facility operations	33	33	79	79	84	84	196
Direct project related support costs	282	282	222	222	236	236	3,885
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	5,464	5,464	301	301	320	320	36,483
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	5,464	5,464	301	301	320	320	36,483
Non-DOE funding:							
State share	(515)	(515)	0	0	0	0	(2,804)
Total Project funding:	$ 4,949	$ 4,949	$ 301	$ 301	$ 320	$ 320	$ 33,679

Falls City Uranium Mill Tailings Project
Falls City, Texas

Total Estimated Cost (TEC): $33,679,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- o With the full participation of the affected states and Indian tribes.
- o In accordance with standards issued by the Environmental Protection Agency (EPA).
- o With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Southeast Texas, about 46 miles southeast of San Antonio, 10 miles southwest of Falls City.

Site Description

The site is located on gently sloping rolling terrain. The total site covers approximately 1,500 acres. The tailings are in 6 piles covering about 150 acres. Five piles are relatively close together and one pile (No. 3) is relatively remote. The tailings are partially stabilized with approximately 2 feet of cover and vegetation.

The mill site covers approximately 10 acres. Most of the original structures and equipment remain. From 1967 to 1973 approximately 2.5 million tons of ore were processed at the mill site.

Falls City Uranium Mill Tailings Project
Falls City, Texas

Total Estimated Cost (TEC): $33,679,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Falls City site:

Activity	Start	Complete
Environmental Document	07/82	03/87
Conceptual Design	11/85	02/87
Final Design	13/87	04/88
Vicinity Property Remedial Action	10/88	09/90
Processing Site Remedial Action	10/88	07/91
Surveillance and Maintenance	08/91	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

Falls City Uranium Mill Tailings Project
Falls City, Texas

Total Estimated Cost (TEC): $33,679,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(c) Prior Year Achievements

FY 1985

Initiate environmental assessment.

FY 1986

Continue work on remedial action plan conceptual design and environment assessment.

(d) Current Year Achievements (FY 1987)

Complete environmental assessment and initiate processing site engineering.

(e) Reasons for Increase and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $20,430,000) are as follows:

(1) An increase in the estimate to reflect potential scope changes and schedule extension: $9,584,000
(2) An increase in the cost of data acquisition and NEPA documentation based on experience to date: $2,112,000
(3) An increase in the cost for surveillance and maintenance due to schedule extension: $143,000
(4) An increase in the estimated management support costs: $2,278,000
(5) Increased state-share payments in relation to the TEC increase: ($868,000)

Falls City Uranium Mill Tailings Project
Falls City, Texas

Total Estimated Cost (TEC): $33,679,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimates

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Falls City, Texas.

	Total Cost
Design and construction	$ 28,051
Research and development	4,351
Facility operations	196
Direct project related support costs	3,885
Total DOE Cost	36,483
Non-DOE Costs	(2,804)
Total Estimated Cost	$ 33,679

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Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Green River Uranium Mill Tailings Project
Green River, Utah

Total Estimated Cost (TEC): $20,034,000

Green River Uranium Mill Tailings Project
Green River, Utah

Total Estimated Cost (TEC): $20,034,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 782	$ 782
Research and development	982	321	321	321	638	638	558	558
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	351	257	257	257	430	430	657	657
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,333	578	578	578	1,068	1,068	1,997	1,997
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,333	578	578	578	1,068	1,068	1,997	1,997
Non-DOE funding:								
State share	0	0	0	0	0	0	(78)	(78)
Total Project funding	$ 1,333	$ 578	$ 578	$ 578	$ 1,068	$ 1,068	$ 1,919	$ 1,919

Green River Uranium Mill Tailings Project
Green River, Utah

Total Estimated Cost (TEC): $20,034,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 222	$ 222	$ 0	$ 0	$ 98	$ 98
Research and development	92	92	54	54	120	120
Facility operations	0	0	0	0	0	0
Direct project related support costs	254	254	83	83	219	219
Capital equipment	0	0	0	0	0	0
Total operating expenses	568	568	137	137	437	437
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	568	568	137	137	437	437
Non-DOE funding:						
State share	(22)	(22)	0	0	(10)	(10)
Total Project funding	$ 546	$ 546	$ 137	$ 137	$ 427	$ 427

Green River Uranium Mill Tailings Project
Green River, Utah

Total Estimated Cost (TEC): $20,034,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 5,465	$ 5,465	$ 5,248	$ 5,248	$ 0	$ 0	$11,815
Research and development	145	145	156	156	0	0	3,066
Facility operations	0	0	19	19	82	82	101
Direct project related support costs	1,653	1,653	1,915	1,915	414	414	6,233
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	7,263	7,263	7,338	7,338	496	496	21,215
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	7,263	7,263	7,338	7,338	496	496	21,215
Non-DOE funding:							
State share	(546)	(546)	(525)	(525)	0	0	(1,181)
Total Project funding:	$ 6,717	$ 6,717	$ 6,813	$ 6,813	$ 496	$ 496	$ 20,034

Green River Uranium Mill Tailings Project
Green River, Utah

Total Estimated Cost (TEC): $20,034,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated active uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

East-central portion of Utah, one mile southeast of the town of Green River, 70 miles west of Utah-Colorado border. The site is about 0.5 mile from the Green River.

Site Description

The tailings rest on the upper terrace deposits, the alluvium of the flood plain, and upon Mancos Shale bedrock. The pile is next to a tributary of the Green River called Browns Wash. The total site covers approximately 39 acres of which 9 acres are tailings, 11 acres are the mill, 4 acres are contaminated with radium, and 15 acres are covered with windblown tailings. The rectangular pile has been partially stabilized with 6 inches of soil. Some remaining structures will be demolished. From 1958 to 1961 approximately 137,000 tons of ore were processed at the mill site.

Green River Uranium Mill Tailings Project
Green River, Utah

Total Estimated Cost (TEC): $20,034,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Green River site:

Activity	Start	Complete
Environmental Document	10/82	09/87
Conceptual Design	04/86	08/87
Final Design	01/87	03/88
Vicinity Property Remedial Action	04/91	06/91
Processing Site Remedial Action	04/91	06/92
Surveillance and Maintenance	07/92	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

Initiated preparation of environmental assessment.

FY 1986

Continue preparation of environmental assessment.

Green River Uranium Mill Tailings Project
Green River, Utah

Total Estimated Cost (TEC): $20,034,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(d) Current Year Achievements (FY 1987)

Complete environmental assessment and initiate processing site engineering.

(e) Reasons for Increase and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $9,879,000) are as follows:

(1) An increase due to improved construction estimate and schedule extension: $4,348,000
(2) An increase in the estimate for data acquisition and NEPA documentation based on experience to date: $950,000
(3) An increase in the cost for surveillance and maintenance due to schedule extension: $48,000
(4) An increase in the estimated management support and program contingency costs: $5,243,000
(5) An increase in state-share payments due to increase in the TEC: ($434,000)

(f) Cost Estimates

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Green River, Utah.

	Total Cost
Design and construction	$ 11,815
Research and development	3,066
Facility operations	101
Direct project related support costs	6,233
Total DOE Cost	21,215
Non-DOE Costs	(1,181)
Total Estimated Cost	$ 20,034

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Slick Rock Uranium Mill Tailings Project
Slick Rock, Colorado

Total Estimated Cost (TEC): $21,177,000

Slick Rock Uranium Mill Tailings Project
Slick Rock, Colorado

Total Estimated Cost (TEC): $21,177,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 654	$ 654
Research and development	980	331	331	331	154	154	38	38
Facility operations	0	0	0	0	0	0	0	0
Direct project related support costs	351	259	259	259	100	100	105	105
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,331	590	590	590	254	254	797	797
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,331	590	590	590	254	254	797	797
Non-DOE funding:								
State share	0	0	0	0	0	0	(65)	(65)
Total Project funding	$ 1,331	$ 590	$ 590	$ 590	$ 254	$ 254	$ 732	$ 732

Slick Rock Uranium Mill Tailings Project
Slick Rock, Colorado

Total Estimated Cost (TEC): $21,177,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating Expenses (DOE):						
Design and construction	$ 263	$ 263	$ 0	$ 0	$ 98	$ 98
Research and development	2	2	57	57	77	77
Facility operations	0	0	0	0	0	0
Direct project related support costs	108	108	83	83	86	86
Capital equipment	0	0	0	0	0	0
Total operating expenses	373	373	140	140	261	261
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	373	373	140	140	261	261
Non-DOE funding:						
State share	(26)	(26)	0	0	(10)	(10)
Total Project funding	$ 347	$ 347	$ 140	$ 140	$ 251	$ 251

Slick Rock Uranium Mill Tailings Project
Slick Rock, Colorado

Total Estimated Cost (TEC): $21,177,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 4,844	$ 4,844	$ 9,860	$ 9,860	$ 0	$ 0	$15,719
Research and development	86	86	76	76	0	0	1,801
Facility operations	0	0	0	0	0	0	0
Direct project related support costs	1,881	1,881	2,157	2,157	98	98	5,228
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	6,811	6,811	12,093	12,903	98	98	22,748
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	6,811	6,811	12,093	12,093	98	98	22,748
Non-DOE funding:							
State share	(484)	(484)	(986)	(986)	0	0	(1,571)
Total Project funding	$ 6,327	$ 6,327	$ 11,107	$ 11,107	$ 98	$ 98	$ 21,177

Slick Rock Uranium Mill Tailings Project
Slick Rock, Colorado

Total Estimated Cost (TEC): $21,177,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorized the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- o With the full participation of the affected states and Indian tribes.
- o In accordance with standards issued by the Environmental Protection Agency (EPA).
- o With the concurrence of the Nuclear Regulatory Commission (NRC)

Location:

The North Continent (NC) and Union Carbide (UC) sites are in southwest Colorado about 9 miles east of the Utah border and 3 miles northwest of the Post Office at Slick Rock, Colorado. The two sites are about 1 mile apart on the Dolores River.

Site Description:

The sites are located on gently sloping to rough terrain adjacent to the Dolores River. The sites are relatively barren. The two sites combined cover approximately 106 acres. The two tailings piles cover 19 and 6 acres, respectively. The tailings are stabilized with 6 inches of cover. Most of the original structures have been demolished and removed. A gas cleaning facility is presently operating on the western edge of the Union Carbide site. From 1931 to 1957 approximately 37,000 tons of ore were processed at the NC mill site. The UC site was an upgrader plant only and processed about 350,000 tons of ore.

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Slick Rock site:

Activity	Start	Complete
Environmental Document	04/82	08/87
Conceptual Design	07/86	08/87
Final Design	01/87	03/88
Vicinity Property Remedial Action	04/90	09/92
Processing Site Remedial Action	04/91	09/99
Surveillance and Maintenance	10/92	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

Slick Rock Uranium Mill Tailings Project
Slick Rock, Colorado

Total Estimated Cost (TEC): $21,177,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(c) Prior Year Achievements

FY 1985

Continued preparation of environmental documentation.

FY 1986

Continue conceptual design and preparation of environmental documentation.

(d) Current Year Achievements (FY 1987)

Complete environmental documentation and conceptual design. Initiate processing site engineering.

(e) Reasons for Increases and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $11,359,000) are as follows:

(1) An increase in the construction costs due to estimate refinement and schedule extension: $6,580,000
(2) A decrease in the estimated cost for data acquisition and NEPA documentation: ($293,000)
(3) A decrease in the estimated cost for surveillance and maintenance: ($40,000)
(4) An increase in management support and contingency estimates: $4,182,000
(5) An increase in state-share payments due to the TEC increase: ($611,000)

Slick Rock Uranium Mill Tailings Project
Slick Rock, Colorado

Total Estimated Cost (TEC): $21,177,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimate

The costs shown include design and construction, research and development, facility operations, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Slick Rock, Colorado.

	Total Cost
Design and construction	$ 15,719
Research and development	1,801
Facility operations	0
Direct project related support costs	5,228
Total DOE Cost	$ 22,748
Non-DOE Costs	(1,571)
Total Estimated Cost	$ 21,177

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Belfield/Bowman Uranium Mill Tailings Project
Belfield and Bowman, North Dakota

Total Estimated Cost (TEC): $18,405,000

Belfield/Bowman Uranium Mill Tailings Project
Belfield and Bowman, North Dakota

Total Estimated Cost (TEC): $18,405,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 215	$ 215
Research and development	1,958	242	242	242	1,090	1,090	764	764
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	702	424	424	424	405	405	907	907
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	2,660	666	666	666	1,495	1,495	1,886	1,886
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	2,660	666	666	666	1,495	1,495	1,886	1,886
Non-DOE funding:								
State share	0	0	0	0	0	0	(22)	(22)
Total Project funding	$ 2,660	$ 666	$ 666	$ 666	$ 1,495	$ 1,495	$ 1,864	$ 1,864

Belfield/Bowman Uranium Mill Tailings Project
Belfield and Bowman, North Dakota

Total Estimated Cost (TEC): $18,405,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 153	$ 153	$ 0	$ 0	$ 293	$ 293
Research and development	109	109	109	109	199	199
Facility operations	0	0	0	0	0	0
Direct project related support costs	349	349	83	83	219	219
Capital equipment	0	0	0	0	0	0
Total operating expenses	611	611	192	192	711	711
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	611	611	192	192	711	711
Non-DOE funding:						
State share	(15)	(15)	0	0	(29)	(29)
Total Project funding	$ 596	$ 596	$ 192	$ 192	$ 682	$ 682

Belfield/Bowman Uranium Mill Tailings Project
Belfield and Bowman, North Dakota

Total Estimated Cost (TEC): $18,405,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 3,273	$ 3,273	$ 3,112	$ 3,112	$ 0	$ 0	$ 7,046
Research and development	237	237	230	230	0	0	4,938
Facility operations	0	0	19	19	57	57	76
Direct project related support costs	1,691	1,691	1,886	1,886	383	383	7,049
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	5,201	5,201	5,247	5,427	440	440	19,109
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	5,201	5,201	5,247	5,247	440	440	19,109
Non-DOE funding:							
State share	(327)	(327)	(311)	(311)	0	0	(704)
Total Project funding:	$ 4,874	$ 4,874	$ 4,936	$ 4,936	$ 440	$ 440	$ 18,405

Belfield/Bowman Uranium Mill Tailings Project
Belfield and Bowman, North Dakota

Total Estimated Cost (TEC): $18,405,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Southwestern North Dakota, one mile southwest of the town of Belfield, Stark County, and about 19 miles west of Dickinson, North Dakota.

Site Description

The site is nearly level and rests on 6 feet of clay. An intermittent stream passes near the site. No tailings exist because the ore was processed into ash and removed to another site for uranium extraction. Only scattered ash remains at the partially stabilized site. Uranium-bearing lignite coal (60 tons/day), after organic combustion, was shipped to Rifle, Colorado, for processing between 1964 and 1966.

The total site covers 29 acres of which 8 acres are contaminated and 21 acres contain windblown contamination. Some buildings were decontaminated and are in use; however, a few other buildings will be demolished.

Belfield/Bowman Uranium Mill Tailings Project
Belfield and Bowman, North Dakota

Total Estimated Cost (TEC): $18,405,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

BOWMAN SITE

Location:

Southwest corner of North Dakota about seven miles west of Bowman, Bowman County, North Dakota.

Site Description:

The partially stabilized site is on nearly level ground about 1 mile north of Spring Creek. There is no evidence of site erosion and the surrounding land is basically used for grazing. No tailings exist at the site because the ore was processed into ash and hauled to another mill for uranium extraction. Uranium-bearing lignite coal (80-90 tons/day), after organic combustion, was shipped to Ambrosia Lake, New Mexico, for processing between 1963-1967.

The total site contains 12 acres of contaminated ore or ash with an additional 25 acres of contaminated windblown soil off the site. Most of the structures were removed; however, some rubble remains.

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Belfield and Bowman sites:

Activity	Start	Complete
Environmental Document	04/82	09/87
Conceptual Design	11/86	09/87
Final Design	02/87	03/88
Vicinity Property Remedial Action	06/91	09/91

Total Estimated Cost (TEC): $18,405,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Processing Site Remedial Action	04/91	06/92
Surveillance and Maintenance	07/92	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1986

Initiate conceptual design and continue development of environmental assessment.

(d) Current Year Achievements (FY 1987)

Complete environmental assessment and initiate processing site engineering.

Belfield/Bowman Uranium Mill Tailings Project
Belfield and Bowman, North Dakota

Total Estimated Cost (TEC): $18,405,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(e) Reasons for Increase and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $12,899,000) are as follows:

(1) A decrease in the estimated costs due to merging of the two site remedial actions: ($940,000)
(2) An increase in the estimated cost of data acquisition and NEPA documentation: $877,000
(3) A decrease in the estimated cost for surveillance and maintenance: ($4,000)
(4) An increase in the estimated management support and contingency estimates: $5,448,000
(5) A decrease in state-share payments due to the TEC increase: $125,000

(f) Cost Estimates

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Belfield and Bowman, North Dakota.

	Total Cost
Design and construction	$ 7,046
Research and development	4,938
Facility operations	76
Direct project related support costs	7,049
Total DOE Cost	19,109
Non-DOE Costs	(704)
Total Estimated Cost	$ 18,405

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Maybell Uranium Mill Tailings Project
Maybell, Colorado

Total Estimated Cost (TEC): $21,710,000

Maybell Uranium Mill Tailings Project
Maybell, Colorado

Total Estimated Cost (TEC): $21,710,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 637	$ 637
Research and development	943	244	244	244	572	572	388	388
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	333	239	239	239	400	400	527	527
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,276	483	483	483	972	972	1,552	1,552
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,276	483	483	483	972	972	1,552	1,552
Non-DOE funding:								
State share	0	0	0	0	0	0	(64)	(64)
Total Project funding	$ 1,276	$ 483	$ 483	$ 483	$ 972	$ 972	$ 1,488	$ 1,488

Maybell Uranium Mill Tailings Project
Maybell, Colorado

Total Estimated Cost (TEC): $21,710,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 0	$ 0	$ 184	$ 184	$ 4,361	$ 4,361
Research and development	60	60	135	135	121	121
Facility operations	0	0	0	0	0	0
Direct project related support costs	108	108	257	257	1,474	1,474
Capital equipment	0	0	0	0	0	0
Total operating expenses	168	168	576	576	5,956	5,956
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	168	168	576	576	5,956	5,956
Non-DOE funding:						
State share	0	0	(18)	(18)	(436)	(436)
Total Project funding	$ 168	$ 168	$ 558	$ 558	$ 5,520	$ 5,520

Maybell Uranium Mill Tailings Project
Maybell, Colorado

Total Estimated Cost (TEC): $21,710,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 8,672	$ 8,672	$ 725	$ 725	$ 0	$ 0	$ 14,579
Research and development	145	145	141	141	0	0	2,749
Facility operations	0	0	19	19	56	56	75
Direct project related support costs	1,733	1,733	337	337	357	357	5,765
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	10,550	10,550	1,222	1,222	413	413	23,168
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	10,550	10,550	1,222	1,222	413	413	23,168
Non-DOE funding:							
State share	(867)	(867)	(73)	(73)	0	0	(1,458)
Total Project funding:	$ 9,683	$ 9,683	$ 1,149	$ 1,149	$ 413	$ 413	$ 21,710

Maybell Uranium Mill Tailings Project
Maybell, Colorado

Total Estimated Cost (TEC): $21,710,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Northwestern Colorado, 25 miles west of Craig, and 5 miles north of Yampa River.

Site Description

The site is located on gently sloping terrain and is surrounded by numerous open pit uranium mines and overburden piles. The total site covers 110 acres. The tailings cover about 80 acres; the mill site covers approximately 20 acres. An area approximately 50 acres surrounding the site, primarily to the east, is contaminated with windblown tailings.

The tailings are stabilized with 6 inches of cover. The original mill building and other structures have been removed. A heap leach facility is in operation to the west of the tailings. Between 1957 and 1964 approximately 2.6 million tons of ore were processed at the mill site.

Maybell Uranium Mill Tailings Project
Maybell, Colorado

Total Estimated Cost (TEC): $21,710,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Maybell site:

Activity	Start	Complete
Environmental Document	01/82	09/87
Conceptual Design	06/86	09/87
Final Design	12/86	03/88
Vicinity Property Remedial Action	NA	NA
Processing Remedial Action Site	04/90	06/92
Surveillance and Maintenance	07/92	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

Maybell Uranium Mill Tailings Project
Maybell, Colorado

Total Estimated Cost (TEC): $21,710,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(c) Prior Year Achievements

FY 1985

Continued preparation of environmental documentation

FY 1986

Initiate conceptual design and continue environmental documentation effort.

(d) Current Year Achievements (FY 1987)

Complete environmental documentation and initiate processing site engineering.

(e) Reasons for Increases and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $13,149,000) are as follows:

(1) An increase in construction costs due to revised estimates and schedule extension: $3,323,000
(2) An increase in the estimated cost of data acquisition and NEPA documentation based on experience: $818,000
(3) An increase in the cost for surveillance and maintenance: $35,000
(4) An increase in management support and contingency estimates: $4,629,000
(5) An increase in state-share payments due to the TEC increase: ($244,000)

Maybell Uranium Mill Tailings Project
Maybell, Colorado

Total Estimated Cost (TEC): $21,710,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimate

The costs shown include design and construction, research and development, facility operations, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Maybell, Colorado.

	Total Cost
Design and construction	$ 14,579
Research and development	2,749
Facility operations	75
Direct project related support costs	5,765
Total DOE Cost	23,168
Non-DOE Costs	(1,458)
Total Estimated Cost	$ 21,710

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Lowman Uranium Mill Tailings Project
Lowman, Idaho

Total Estimated Cost (TEC): $11,841,000

Lowman Uranium Mill Tailings Project
Lowman, Idaho

Total Estimated Cost (TEC): $11,841,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 255	$ 255
Research and development	979	151	151	151	413	413	863	863
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	351	218	218	218	339	339	693	693
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,330	369	369	369	752	752	1,811	1,811
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,330	369	369	369	752	752	1,811	1,811
Non-DOE funding:								
State share	0	0	0	0	0	0	(25)	(25)
Total Project funding	$ 1,330	$ 369	$ 369	$ 369	$ 752	$ 752	$ 1,786	$ 1,786

Lowman Uranium Mill Tailings Project
Lowman, Idaho

Total Estimated Cost (TEC): $11,841,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 90	$ 90	$ 0	$ 0	$ 0	$ 0
Research and development	146	146	58	58	119	119
Facility operations	0	0	0	0	0	0
Direct project related support costs	375	375	110	110	249	249
Capital equipment	0	0	0	0	0	0
Total operating expenses	611	611	168	168	368	368
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	611	611	168	168	368	368
Non-DOE funding:						
State share	(9)	(9)	0	0	0	0
Total Project funding	$ 602	$ 602	$ 168	$ 168	$ 368	$ 368

Lowman Uranium Mill Tailings Project
Lowman, Idaho

Total Estimated Cost (TEC): $11,841,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 207	$ 207	$ 3,881	$ 3,881	$ 0	$ 0	$ 4,433
Research and development	146	146	0	0	0	0	2,875
Facility operations	0	0	0	0	78	78	78
Direct project related support costs	478	478	1,921	1,921	164	164	4,898
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	831	831	5,802	5,802	242	242	12,284
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding	831	831	5,802	5,802	242	242	12,284
Non-DOE funding:							
State share	(21)	(21)	(388)	(388)	0	0	(443)
Total Project funding:	$ 810	$ 810	$ 5,414	$ 5,414	$ 242	$ 242	$ 11,841

Lowman Uranium Mill Tailings Project
Lowman, Idaho

Total Estimated Cost (TEC): $11,841,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

75 miles northeast of Boise, Idaho; at the junction of Clear Creek and the South Fork Payette River.

Site Description

The total site located on a relatively steep hillside, covers an area of 37 acres. The sand residues are in 10 different piles covering about 10 acres. Total residue is about 67,000 tons. The process used was mechanical instead of chemical and process solutions were not contaminated with dissolved materials. During the period 1955-1960 approximately 200,000 tons of ore were processed at the mill site.

Lowman Uranium Mill Tailings Project
Lowman, Idaho

Total Estimated Cost (TEC): $11,841,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Lowman site:

Activity	Start	Complete
Environmental Document	01/82	04/88
Conceptual Design	06/87	04/88
Final Design	03/87	03/88
Vicinity Property Remedial Action	04/92	08/92
Processing Site Remedial Action	04/92	09/92
Surveillance and Maintenance	10/92	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistant Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surevillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1986

Initiate conceptual design and continue development of environmental assessment.

(d) Current Year Achievements (FY 1987)

Continue work on environmental assessment and initiate processing site engineering.

Lowman Uranium Mill Tailings Project
Lowman, Idaho

Total Estimated Cost (TEC): $11,841,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(e) Reasons for Increases and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense funded Data Sheet (TEC = $6,634,000 are as follows:

(1) An increase in the estimated construction costs due to estimate improvements: $77,000
(2) An increase in the cost of data acquisition and NEPA documentation based on experience to date: $985,000
(3) An increase in the cost for surveillance and maintenance: $38,000
(4) An increase in the support costs and contingency based on limited data available: $4,098,000
(5) A decrease in state-share payments due to the TEC increase: $9,000

(f) Cost Estimate

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Lowman, Idaho.

	Total Cost
Design and construction	$ 4,433
Research and development	2,875
Facility operations	78
Direct project related support costs	4,898
Total DOE Cost	12,284
Non-DOE Costs	(443)
Total Estimated Cost	$ 11,841

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Energy Supply Research and Development
Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Spook Uranium Mill Tailings Project
Spook, Wyoming

Total Estimated Cost (TEC): $10,243,000

Spook Uranium Mill Tailings Project
Spook, Wyoming

Total Estimated Cost (TEC): $10,243,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 93	$ 93
Research and development	943	125	125	125	390	390	889	889
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	333	211	211	211	342	342	699	699
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,276	336	336	336	732	732	1,681	1,681
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,276	336	336	336	732	732	1,681	1,681
Non-DOE funding:								
State share	0	0	0	0	0	0	(9)	(9)
Total Project funding	$ 1,276	$ 336	$ 336	$ 336	$ 732	$ 732	$ 1,672	$ 1,672

Spook Uranium Mill Tailings Project
Spook, Wyoming

Total Estimated Cost (TEC): $10,243,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 86	$ 86	$ 0	$ 0	$ 98	$ 98
Research and development	114	114	54	54	121	121
Facility operations	0	0	0	0	0	0
Direct project related support costs	325	325	110	110	245	245
Capital equipment	0	0	0	0	0	0
Total operating expenses	525	525	164	164	464	464
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	525	525	164	164	464	464
Non-DOE funding:						
State share	(9)	(9)	0	0	(10)	(10)
Total Project funding	$ 516	$ 516	$ 164	$ 164	$ 454	$ 454

Spook Uranium Mill Tailings Project
Spook, Wyoming

Total Estimated Cost (TEC): $10,243,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 2,455	$ 2,455	$ 357	$ 357	$ 0	$ 0	$ 3,089
Research and development	145	145	156	156	0	0	2,937
Facility operations	0	0	19	19	57	57	76
Direct project related support costs	925	925	878	878	383	383	4,451
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	3,525	3,525	1,410	1,410	440	440	10,553
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	3,525	3,525	1,410	1,410	440	440	10,553
Non-DOE funding:							
State share	(246)	(246)	(36)	(36)	0	0	(310)
Total Project funding:	$ 3,279	$ 3,279	$ 1,374	$ 1,374	$ 440	$ 440	$ 10,243

Spook Uranium Mill Tailings Project
Spook, Wyoming

Total Estimated Cost (TEC): $10,243,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commisison (NRC).

Location:

48 miles northeast of Casper, Converse County, Wyoming.

Site Description

The site exists among rolling hills and open grasslands in an area dotted with mining activities. The total site covers 60 acres, of which nearly 5 acres are covered with tailings. Portions of the tailings are in the nearby open pit mine. Windblown contamination consists of some 12 acres. From 1962 to 1965 approximately 187,000 tons of ore were processed at the mill site.

Spook Uranium Mill Tailings Project
Spook, Wyoming

Total Estimated Cost (TEC): $10,243,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Spook site:

Activity	Start	Complete
Environmental Document	07/81	12/87
Conceptual Design	07/86	11/87
Final Design	04/87	03/88
Vicinity Property Remedial Action	04/91	09/91
Processing Site Remedial Action	04/91	06/92
Surveillance and Maintenance	07/92	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistant Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site charaterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1986

Initiate conceptual design and continue development of environmental assessment.

(d) Current Year Achievements (FY 1987)

Continue work on environmental assessment and initiate processing site engineering.

Spook Uranium Mill Tailings Project
Spook, Wyoming

Total Estimated Cost (TEC): $10,243,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(e) Reasons for Increases and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $4,961,000) are as follows:

(1) An increase in the construction costs due to estimate improvements and schedule extension: $365,000
(2) An increase in data acquisition and NEPA costs based on experience to date: $1,132,000
(3) An increase in the cost of surveillance and maintenance: $36,000
(4) An increase in the support costs and contingency: $3,776,000
(5) An increase in state-share payments due to the TEC increase: ($27,000)

(f) Cost Estimate

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and othe residual radioactive material at Spook, Wyoming.

	Total Cost
Design and construction	$ 3,089
Research and development	2,937
Facility operations	76
Direct project related support costs	4,451
Total DOE Cost	10,553
Non-DOE Costs	(310)
Total Estimated Cost	$ 10,243

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Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Monument Valley Uranium Mill Tailings Project
Monument Valley, Arizona

Total Estimated Cost (TEC): $16,136,000

Monument Valley Uranium Mill Tailings Project
Monument Valley, Arizona

Total Estimated Cost (TEC): $16,136,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 764	$ 764	$ 0	$ 0
Research and development	979	713	713	713	65	65	57	57
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	351	348	348	348	60	60	105	105
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,330	1,061	1,061	1,061	889	889	162	162
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,330	1,061	1,061	1,061	889	889	162	162
Non-DOE funding:								
State share	0	0	0	0	0	0	0	0
Total Project funding	$ 1,330	$ 1,061	$ 1,061	$ 1,061	$ 889	$ 889	$ 162	$ 162

Monument Valley Uranium Mill Tailings Project
Monument Valley, Arizona

Total Estimated Cost (TEC): $16,136,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 87	$ 87	$ 0	$ 0	$ 2,358	$ 2,358
Research and development	79	79	56	56	0	0
Facility operations	0	0	0	0	0	0
Direct project related support costs	81	81	110	110	3,255	3,255
Capital equipment	0	0	0	0	0	0
Total operating expenses	247	247	166	166	5,613	5,613
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	247	247	166	166	5,613	5,613
Non-DOE funding:						
State share	0	0	0	0	0	0
Total Project funding	$ 247	$ 247	$ 166	$ 166	$ 5,613	$ 5,613

Monument Valley Uranium Mill Tailings Project
Monument Valley, Arizona

Total Estimated Cost (TEC): $16,136,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 6,308	$ 6,308	$ 0	$ 0	$ 0	$ 0	$ 9,517
Research and development	0	0	0	0	0	0	1,949
Facility operations	0	0	0	0	0	0	0
Direct project related support costs	115	115	119	119	126	126	4,670
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	6,423	6,423	119	119	126	126	16,136
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	6,423	6,423	119	119	126	126	16,136
Non-DOE funding:							
State share	0	0	0	0	0	0	0
Total Project funding:	$ 6,423	$ 6,423	$ 119	$ 119	$ 126	$ 126	$ 16,136

Monument Valley Uranium Mill Tailings Project
Monument Valley, Arizona

Total Estimated Cost (TEC): $16,136,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- With the full participation of the affected states and Indian tribes.
- In accordance with standards issued by the Environmental Protection Agency (EPA).
- With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Northeast corner of Arizona, on Navajo Nation land, just east of Monument Valley, Arizona; 20 miles east of U.S. 163 where it passes through Monument Valley.

Site Description

The site is located on relatively level terrain. The site consists of 90 acres. The tailings, located in two piles, cover about 30 acres; the mill site covers about 5 acres. From 1955 to 1968 approximately 1.1 million tons of ore were processed at the mill site.

The site is very remote and the existence and condition of a water supply is unknown. Most of the original equipment and structures have been demolished and removed.

Monument Valley Uranium Mill Tailings Project
Monument Valley, Arizona

Total Estimated Cost (TEC): $16,136,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Monument Valley site:

Activity	Start	Complete
Environmental Document	07/81	09/86
Conceptual Design	12/85	12/86
Final Design	10/85	10/86
Vicinity Property Remedial Action	NA	NA
Processing Site Remedial Action	10/89	09/91
Surveillance and Maintenance	10/91	NA

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

Initiated environmental assessment and site conceptual design.

FY 1986

Complete environmental assessment and initiate processing site engineering.

Monument Valley Uranium Mill Tailings Project
Monument Valley, Arizona

Total Estimated Cost (TEC): $16,136,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(d) Current Year Achievements (FY 1987)

Complete processing site engineering.

(e) Reasons for Increases and Decreases

Reasons for increase from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $10,993,000) are as follows:

(1) An increase in construction costs due to estimate refinement and schedule extension: $1,450,000
(2) A decrease in data acquisition and NEPA costs: ($5,000)
(3) A decrease in the cost for surveillance and maintenance: ($102,000)
(4) An increase in the estimated management support costs: $3,600,000

(f) Cost Estimate

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material at Monument Valley, Arizona.

	Total Cost
Design and construction	$ 9,517
Research and development	1,949
Facility operations	0
Direct project related support costs	4,670
Total DOE Cost	16,136
Non-DOE Costs	0
Total Estimated Cost	$ 16,136

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Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Edgemont Vicinity Properties Project
Edgemont, South Dakota

Total Estimated Cost (TEC): $4,515,000

Edgemont Vicinity Properties Project
Edgemont, South Dakota

Total Estimated Cost (TEC): $4,515,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Design and construction	$ 1,053	$ 360	$ 360	$ 360	$ 2,244	$ 2,244	$ 0	$ 0
Research and development	210	209	209	209	0	0	0	0
Facility operations	0	0	0	0	0	0	0	0
Direct project related support cost	494	210	210	210	100	100	0	0
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	1,757	779	779	779	2,344	2,344	0	0
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	1,757	779	779	779	2,344	2,344	0	0
Non-DOE funding:								
State share	(105)	(36)	(36)	(36)	(224)	(224)	0	0
Total Project funding	$ 1,652	$ 743	$ 743	$ 743	$ 2,120	$ 2,120	$ 0	$ 0

Edgemont Vicinity Properties Project
Edgemont, South Dakota

Total Estimated Cost (TEC): $4,515,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Research and development	0	0	0	0	0	0
Facility operations	0	0	0	0	0	0
Direct project related support costs	0	0	0	0	0	0
Capital equipment	0	0	0	0	0	0
Total operating expenses	0	0	0	0	0	0
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	0	0	0	0	0	0
Non-DOE funding:						
State share	0	0	0	0	0	0
Total Project funding	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0

Edgemont Vicinity Properties Project
Edgemont, South Dakota

Total Estimated Cost (TEC): $4,515,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		FY 1992 Estimate		FY 1993 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Design and construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 3,657
Research and development	0	0	0	0	0	0	419
Facility operations	0	0	0	0	0	0	0
Direct project related support costs	0	0	0	0	0	0	804
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	0	0	0	0	0	0	4,880
Other DOE funding:	0	0	0	0	0	0	0
Total DOE funding:	0	0	0	0	0	0	4,880
Non-DOE funding:							
State share	0	0	0	0	0	0	(365)
Total Project funding:	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 4,515

Edgemont Vicinity Properties Project
Edgemont, South Dakota

Total Estimated Cost (TEC): $4,515,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, 42 USC 7901 (hereinafter referred to as the "Act"), authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.

The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to be public. Pursuant to the Act, the remedial actions undertaken by DOE are to be accomplished:

- o With the full participation of the affected states and Indian tribes.
- o In accordance with standards issued by the Environmental Protection Agency (EPA).
- o With the concurrence of the Nuclear Regulatory Commission (NRC).

Location:

Southwest corner of South Dakota, in Fall River County, at the junction of U.S. Highway 18 and S.D. State Highway 52.

Site Description

It is estimated that some 12,000 cubic yards of tailings and contaminated materials will be removed from approximately 110 vicinity properties located in and near Edgemont, South Dakota.

The tailings and other materials will be temporarily stored at the inactive mill site on the eastern edge of town. The mill site is owned by the Tennessee Valley Authority (TVA) and is to be decommissioned by TVA. The materials from the vicinity properties will be moved to a permanent storage site 3 miles to the southeast of the mill site during decommissioning of the mill site.

Edgemont Vicinity Properties Project
Edgemont, South Dakota

Total Estimated Cost (TEC): $4,515,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the primary tasks for activities at the Edgemont site:

Activity	Start	Complete
Vicinity Property Remedial Action	08/83	09/86

(b) Management and Contracting

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office has competitively awarded multi-year contracts for a Technical Assistance Contractor (TAC) and a Remedial Action Contractor (RAC) to support the DOE on UMTRA Project activities. The TAC is responsible for: site characterization; NEPA documentation; conceptual design; technology development; technical and management support; and, surveillance and maintenance following completion of remedial actions. The RAC performs: engineering design; remedial action construction management; site health and safety; and, quality assurance. Actual construction will be performed by RAC-managed subcontractors.

(c) Prior Year Achievements

FY 1985

Initiated vicinity property engineering and complete remedial actions for a total of 40 vicinity properties.

FY 1986

Complete remedial action for all remaining vicinity properties

(d) Current Year Achievements (FY 1987)

No remedial action is planned for FY 1987.

Edgemont Vicinity Properties Project
Edgemont, South Dakota

Total Estimated Cost (TEC): $4,515,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(e) Reasons for Increases and Decreases

Reasons for decrease from the FY 1986 Budget Request Operating Expense Funded Data Sheet (TEC = $5,221,000) are as follows:

(1) A decrease in the estimated costs due to estimate revisions: ($757,000)
(2) A decrease in the estimated costs for audit and certification activity: ($200,000)
(3) An increase in the estimated management support costs: $158,000
(4) Decreased state-share payments in relation to the TEC decrease: $93,000

(f) Cost Estimate

The costs shown include design and construction, research and development, and direct project related support costs to stabilize and control the uranium mill tailings and other residual radioactive material for the vicinity properties at Edgemont, South Dakota.

	Total Cost
Design and construction	$ 3,657
Research and development	419
Facility operations	0
Direct project related support costs	804
Total DOE Cost	4,880
Non-DOE Costs	(365)
Total Estimated Cost	$ 4,515

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NUCLEAR ENERGY

Energy Supply Research and Development
Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

Weldon Spring Site Remedial Action Project (WSSRAP)
Oak Ridge Operations Office

Total Project Cost Estimate (TPCE): $357,667,000
(For Engineering, Maintenance and Surveillance,
Construction, and Decommissioning Operations)
based on pre-conceptual engineering design data.

Weldon Spring Site Remedial Action Project (WSSRAP)
Oak Ridge Operations Office

Total Project Cost Estimate (TPCE): $357,667,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Actual			FY 1986 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O
Operating expenses (DOE):						
Engineering and decommissioning	$ 2,096	$ 1,671	$ 1,671	$ 1,702	$ 4,650	$ 4,650
Direct project related support costs	218	269	269	269	240	240
Capital equipment	25	0	0	0	10	10
Total operating expenses	2,339	1,940	1,940	1,971	4,900	4,900
Other DOE funding:						
Maintenance and surveillance	0	0	0	0	145	145
Total DOE funding:	2,339	1,940	1,940	1,971	5,045	5,045
Non-DOE funding:	0	0	0	0	0	0
Total Project funding	$ 2,339	$ 1,940	$ 1,940	$ 1,971	$ 5,045	$ 5,045

Weldon Spring Site Remedial Action Project (WSSRAP)
Oak Ridge Operations Office

Total Project Cost Estimate (TPCE): $357,667,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1987 Estimate		FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Engineering and decommissioning	$ 12,959	$ 10,109	$ 26,316	$ 20,416	$ 28,391	$ 29,391	$ 32,365	$ 33,365
Direct project related support costs	537	537	221	221	235	235	251	251
Capital equipment	200	200	200	200	200	200	200	200
Total operating expense	13,696	10,846	26,737	20,837	28,826	29,826	32,816	33,816
Other DOE funding:								
Maintenance and surveillance	154	154	163	163	174	174	184	184
Total DOE funding:	13,850	11,000	26,900	21,000	29,000	30,000	33,000	34,000
Non-DOE funding:	6,000	6,000	7,900	7,900	12,000	11,000	20,000	16,000
Total Project funding	$ 19,850	$ 17,000	$ 34,800	$ 28,900	$ 41,000	$ 41,000	$ 53,000	$ 50,000

Weldon Spring Site Remedial Action Project (WSSRAP)
Oak Ridge Operations Office

Total Project Cost Estimate (TPCE): $357,667,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		Estimate Through Project Completion		Total Cost
	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):					
Engineering and decommissioning	$ 29,338	$ 30,338	$ 84,573	$ 90,292	$222,359
Direct project related support costs	266	266	1,439	1,439	3,676
Capital equipment	200	200	600	600	1,635
Total operating expense	29,804	30,804	86,612	92,331	227,670
Other DOE funding:					
Maintenance and surveillance	196	196	1,191	1,191	2,207
Total DOE funding:	30,000	31,000	87,803	93,522	229,877
Non-DOE funding:					
	19,000	19,000	62,890	67,890	127,790
Total Project funding:	$ 49,000	$ 50,000	$150,693	$161,412	$357,667

Weldon Spring Site Remedial Action Project (WSSRAP)
Oak Ridge Operations Office

Total Project Cost Estimate (TPCE): $357,667,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Weldon Spring Site is located in St. Charles County, Missouri, about 30 miles west of St. Louis, on land formerly used by the Department of the Army (DA) as a trinitrotoluene (TNT) ordnance works. The site consists of a 3.4 ha (9-acre) abandoned limestone quarry; a 21 ha (51-acre) raffinate disposal area; and a 69.6 ha (169-acre) mothballed uranium feed materials plant. The feed plant was built during 1955-1957 by the Atomic Energy Commission (AEC), predecessor agency to DOE, and operated by Mallinckrodt Inc. for the AEC from 1957 to 1966. During operations of the plant, the buildings, equipment, immediate terrain, process sewer system and drainage easement to the Missouri River became contaminated with uranium, thorium, and their decay products.

During the period 1943-1957, DA utilized the Weldon Spring Quarry (WSQ) for disposal of rubble and soils contaminated with TNT and dinitrotoluene (DNT), and DOE disposed of building rubble and soils contaminated with thorium, uranium and decay products. The WSQ contains a total of 99,400 m^3 (130,000 yd^3) of wastes, including quarry materials contaminated by the radioactive wastes.

In 1967, the feed materials plant site was selected for a herbicide production facility and except for the materials stored in the Weldon Spring Raffinate Pits (WSRP), the site was transferred back to the DA and renamed the Weldon Spring Chemical Plant (WSCP). The Army began a major effort to decontaminate three process buildings for herbicide production. The cleanup was not totally successful, and subsequently, reduced requirements for the herbicide and increased cleanup costs resulted in cancellation in 1969. Approximately 238,600 m^3 (312,000 yd^3) of contaminated soil, equipment, and building rubble remaining on the WSCP site requires cleanup to meet current guidelines for unrestricted use.

The 51 acres encompassing the WSRP site were transferred back to the AEC (now DOE) in 1971. The WSRP contain approximately 168,200 m^3 (220,000 yd^3) of residues. In addition, it is estimated that 98,900 m^3 (129,400 yd^3) of clay beneath the pits was contaminated by these radioactive wastes.

The sites have been in care and custody status since activities ceased in 1969. In June 1975 environmental and radiological surveys were initiated. Preliminary analyses show that the site cannot be released for unrestricted use without radiological decontamination. Trace levels of TNT and DNT residues are present throughout the area; however, no explosive hazard exists. Preliminary estimate indicates approximately 78,000 m^3 (102,000 yd^3) of contaminated material may require removal and disposal. Monitoring shows continuing offsite migration of radionuclides. Remedial actions are necessary to stabilize the wastes.

Weldon Spring Site Remedial Action Project (WSSRAP)
Oak Ridge Operations Office

Total Project Cost Estimate (TPCE): $357,667,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

On November 27, 1984, the OMB directed DOE to assume custody and accountability for the WSCP from the DA. The DOE was directed to assume responsibility for the decontamination of the WSCP and to integrate that work with other DOE remedial actions proposed for the WSQ, WSRP, and Weldon Spring vicinity properties (WSVP). The DOE and DA were directed to share the cost for the WSCP remedial actions. A Memorandum of Understanding regarding the site transfer and the allocation of funding sharing was approved on February 11, 1985. Transfer of custody and control of the WSCP was effected on October 1, 1985.

The scope of the WSSRAP includes:

- Maintenance and surveillance of the site as necessary to maintain public safety and reduce radiological impact to as low as reasonably achievable, in preparation for site disposition.
- Integrated planning, engineering, and technology development as necessary to support evaluation of long-range disposition alternatives.
- Complete the environmental impact assessment process.
- Plan and implement the remedial action program required to adequately cleanup the site.
- Assume custody and accountability for the WSCP at the beginning of FY 1986 and integrate remedial actions at the WSCP with the WSRP, WSQ, and WSVP.
- Priority will be given to decontaminating the WSQ to reduce migration of radiologic contaminants toward the well field serving portions of St. Charles County.

Weldon Spring Site Remedial Action Project (WSSRAP)
Oak Ridge Operations Office

Total Project Cost Estimate (TPCE): $357,667,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the total program broken down by primary tasks:

Activity	Start	Complete
Radiological, Geological, Chemical and Hydrological Characterization	1st Qtr., FY 1982	4th Qtr., FY 1987
Engineering Studies	1st Qtr., FY 1982	4th Qtr., FY 1987
NEPA Support (Pits, Quarry, and Vicinity Property)	1st Qtr., FY 1982	1st Qtr., FY 1987
NEPA Support (Chemical Plant)	4th Qtr., FY 1986	2nd Qtr., FY 1988
Design Engineering and Support Remedial Actions	1st Qtr., FY 1987	4th Qtr., FY 1996
Remedial Action		
Site Preparation/Support Facilities	1st Qtr., FY 1987	2nd Qtr., FY 1988
Quarry	1st Qtr., FY 1988	4th Qtr., FY 1991
Raffinate Pits	1st Qtr., FY 1988	4th Qtr., FY 1994
Vicinity Properties	3rd Qtr., FY 1992	4th Qtr., FY 1994
Chemical Plant	3rd Qtr., FY 1989	4th Qtr., FY 1995

(b) Management and Contracting

Through FY 1985, the project was managed for the DOE by the Oak Ridge Operations Office (OR) reporting through the Richland Operations Office. The OR Technical Services Division (TSD) provided technical, administrative, and financial management of the Weldon Spring project on a day-to-day basis in compliance with Surplus Facilities Management Program policies and all other applicable DOE orders, directives, and specific guidance. In this capacity, OR-TSD oversaw the work of Bechtel National, Inc. (BNI) which acted as the OR-TSD representative in the planning and management of the WSS project, during the conceptual study period, since October 1981. This OR-TSD operational role concluded in effect on October 1, 1985, with the establishment of the Project Manager. However, the Project Manager will report to the OR-AMC&E through the Director, OR-TSD in FY 1986 until requisite organization and staffing actions occur commensurate with evolving needs. An onsite Project Office will be established by October 1986.

The Project Manager will be responsible for WSSRAP as a DOE Major Project under DOE Order 5700. The Project Office will provide technical, administrative, and financial management of the integrated project on a day-to-day basis. Competitive procurement was planned during FY 1985 and FY 1986, with a Project Management Contractor (PMC) to be selected prior to October 1, 1986. The PMC will be responsible for the final design and construction, surveillance and maintenance, and insuring completion of the project in accordance with DOE guidance. In implementing approved remedial actions, the PMC will utilize local subcontractors in the Weldon Spring region to the extent that it is cost-effective and programmatically expedient.

Argonne National Laboratory (ANL) is the EIS preparation contractor.

The Oak Ridge Associated Universities (ORAU) is the radiological survey contractor for the vicinity properties.

(c) Prior Year Achievements

Site surveillance and maintenance were performed for the WSRP and WSQ; surface water samples were analyzed; conceptual studies were performed; geological conditions were investigated; and an Engineering Evaluation of Alternatives was prepared. The Project Management Plan was prepared and updated. Water balance studies and environmental monitoring were performed. A plan for integrating the WSCP work with the WSRP and WSQ work was developed. A procurement plan was prepared for acquisition of the PMC for final design and implementation of the remedial work. A Request for Proposal was prepared and issued during FY 1985. The project was designated a Major Project.

(d) Current Year Planning Achievements

In FY 1986 the WSSRAP Project Office will be established on-site and will assume responsibility for the project from OR-TSD. Site surveillance and maintenance and environmental monitoring continued. The radiological report on the WSQ and the 1985 Environmental Report were issued. The EIS will be prepared. A PMC will be selected and a contract signed. Radiological characterization of the WSCP began.

Total Project Cost Estimate (TPCE): $357,667,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(e) Budget Year Planned Achievements

The new PMC will assume responsibility in FY 1987. The current contractor will provide assistance during a transition period. Detailed engineering and remedial action for the WSQ will be undertaken, as will disposal cell site preparation at the WSRP. Water treatment of WSRP water will begin. Surveillance and maintenance and environmental monitoring will continue. Necessary permits for receiving WSQ wastes at the WSRP and/or WSCP for temporary storage will be initiated, as will permits for water discharge. Geological/hydrological, chemical, and radiological characterization of the WSCP will be completed. Preliminary engineering for WSCP remedial actions will be initiated.

(f) Reasons for Increase and Decreases

The overall project scope has been expanded to include the WSCP and redesignated as a Major Project entitled, "The Weldon Spring Site Remedial Action Project."

(g) Cost Estimate (WSRP, WSQ, WSVP and WSCP)

	Item Cost	Total Cost
1. Operating Expenses		$288,394
a. Radiological characterization, conceptual engineering in support of NEPA activities, preparation of Project Management Plan, Geologic Report, monitoring reports, and related activities during FY 1982-1985	$ 3,127	
b. NEPA	1,270	
c. Engineering and support for remedial action	22,850	
d. Decontamination and Decommissioning Operations		
Decommissioning WSRP, WSQ, and WSVP	58,503	
Site preparation and removal of clean facilities, WSCP	29,775	
Removal of slightly contaminated facilities, WSCP	9,350	
Removal of highly contaminated facilities, WSCP	49,135	
Removal of sewers and support facilities, WSCP	18,690	
Land decontamination, WSCP	21,360	
Compact waste delivered to pit area, WSCP	16,640	
Radiological support, WSCP	13,485	

e.	Management Support	32,993	
f.	Surveillance and Maintenance	7,066a/	
	Guard Services and Groundskeeping	4,150	
g.	Contingency @ approximately 24%		69,273
	Total Estimated Cost		$357,667a/

Footnote to Cost Estimate:

a/ The Memorandum of Understanding between DA and DOE approved February 11, 1985, limited the DA funding responsibility (subject to availability of appropriated funds) to 50 percent of the cost incurred to address contamination at WSCP. This includes interim control actions, remedial action planning and engineering, site characterization, NEPA documentation, plant demolition, site cleanup, and waste disposal. The DOE share includes 50 percent of the above items plus 100 percent of the cost of guards, groundskeeping, long-term management and monitoring, actions at WSCP unrelated to decontaminating WSCP, and funding of other Weldon Spring sites. Where indirect and general purpose expenses are incurred on the WSQ, WSRP, and/or WSCP, the share attributable to WSCP will be fairly apportioned. The preliminary estimate of the DA share is $127,790,000, and the DOE share for WSCP remedial actions is $129,997,000.

Assumptions:

1. The Schedule 47 is based on the DOE management determination that WSSRAP will consolidate the work at the WSQ, WSRP, WSVP, and WSCP and will be managed by the DOE-Oak Ridge as a Major Project under DOE Order 5700.

   Beginning October 1, 1985, and continuing to not later than September 30, 1986, the Project Manager reports to the OR Assistant Manager for Construction and Engineering through the Director, OR-TSD. In this way, project support contracting activities, site management, program organization, and work transitions occur consistent with evolving needs. The change to formal reporting by the Project Manager to the AMC&E will take place during FY 1986 as circumstances and project activities dictate.

2. The TPCE of this project is an integration of cost estimates from two subprojects, consisting of (a) the WSRP, WSQ, and WSVP, and (b) the WSCP. The integrated TPCE is the sum of these two subprojects, with no credit taken at this time for efficiencies achievable from consolidated management and coordination of effort. Refinements in the TPCE will be made during FY 1987 and FY 1988 as design engineering is completed and a decision is made on where to dispose of the waste.

Weldon Spring Site Remedial Action Project (WSSRAP)
Oak Ridge Operations Office

Total Project Cost Estimate (TPCE): $357,667,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

a. The TPCE for the WSRP, WSQ, and WSVP, subproject is based on an Engineering Evaluation of Alternatives (EEA) study which has been performed and includes:

- Stabilization and containment of the waste currently stored at the WSRP.
- Excavation and transportation of the waste currently stored at the WSQ to the WSRP for containment.
- Excavation and transportation of the waste from the WSVP to the WSRP for containment.

b. The TPCE for the WSCP sub-project is based upon a DA Program Plan for the Decontamination of Weldon Spring Chemical Plant (Report ESG-79-31, Rockwell, 1979) with DOE preliminary revisions resulting in the following:

- The costs in the 1979 study have been escalated to year-of-expenditure dollars.
- No estimate for contingency was included in the 1979 study. Contingency of approximately 24 percent has been added for consistency with DOE program guidelines.
- Stabilization and entombment of the contaminated waste generated by the WSCP decontamination and demolition will be at a Weldon Spring Site disposal facility.
- Clean (uncontaminated) waste and scrap will be disposed of in a local landfill licensed by the State of Missouri.
- To the extent feasible, uncontaminated and/or decontaminated material and equipment will be sold for salvage or excessed rather than disposed of in waste storage facilities.
- The remedial actions taken on the WSCP will release as much of the site as possible for unrestricted use.

3. The general qualifications and assumptions used in the preparation of the integrated cost estimate include:

   - o The cost estimate is based on volumes of waste determined from available data and is subject to change pending receipt of more current and complete information. For the WSCP, the estimated cost is preliminary and is based on very limited outdated data.
   - o The annual funding shown in this data sheet will be provided so that remedial action activities can proceed on an orderly and realistic schedule to minimize overall project cost due to additional escalation.
   - o TPCE of the project does not include surveillance and maintenance activities which may be required beyond completion of remedial actions.
   - o Estimate does not include WSQ or WSRP costs prior to FY 1982, nor WSCP costs prior to FY 1986.
   - o The TPCE and detailed tabular data are expressed in year-of-expenditure dollars.
   - o Contingency is included at approximately 24 percent.

4. TPCE in year-of-expenditure dollars ranges from $357,667,000 to $850,000,000 dependent upon the option chosen by DOE as a result of the NEPA process. The lowest cost estimate used in this submittal is based upon the selection of the alternative to dispose of waste in a disposal cell to be developed at the WSS.

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(Tabular dollars in thousands. Narrative material in whole dollars.)

Mound ANSPD Areas Decommissioning Project
Albuquerque Operations Office
Dayton Area Office

Total Project Cost Estimate (TPCE): $36,547,000
(For Engineering and Decommissioning Operations)

Mound ANSPD Areas Decommissioning Project
Albuquerque Operations Office
Dayton Area Office

Total Project Cost Estimate (TPCE): $36,547,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Actual			FY 1986 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O
Operating expenses (DOE):						
Decommissioning operations	$ 20,260	$ 4,200	$ 4,200	$ 4,190	$ 4,340	$ 4,350
R&D related to construction	0	0	0	0	0	0
Facility operations	0	0	0	0	0	0
Direct project related support costs	0	0	0	0	0	0
Capital equipment	0	0	0	0	0	0
Total operating expenses	20,260	4,200	4,200	4,190	4,340	4,350
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	20,260	4,200	4,200	4,190	4,340	4,350
Non-DOE funding:	0	0	0	0	0	0
Total Project funding	$ 20,260	$ 4,200	$ 4,200	$ 4,190	$ 4,340	$ 4,350

Mound ANSPD Areas Decommissioning Project
Albuquerque Operations Office
Dayton Area Office

Total Project Cost Estimate (TPCE): $36,547,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1987 Estimate		FY 1988 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):					
Decommissioning operations	$ 4,360	$ 4,360	$ 3,387	$ 3,387	$ 36,547
R&D related to construction	0	0	0	0	0
Facility operations	0	0	0	0	0
Direct project related support costs	0	0	0	0	0
Capital equipment	0	0	0	0	0
Total operating expenses	4,360	4,360	3,387	3,387	36,547
Other DOE funding:	0	0	0	0	0
Total DOE funding:	4,360	4,360	3,387	3,387	36,547
Non-DOE funding:	0	0	0	0	0
Total Project funding	$ 4,360	$ 4,360	$ 3,387	$ 3,387	$ 36,547

Mound ANSPD Areas Decommissioning Project
Albuquerque Operations Office
Dayton Area Office

Total Project Cost Estimate (TPCE): $36,547,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Mound Advanced Nuclear systems and Projects Division (ANSPD) Areas are located at the Mound Site in Miamisburg, Ohio. Mound is owned by the Department of Energy (DOE) and operated by Monsanto Research Corporation. The 303 acre site is located in the suburban Dayton, Ohio, area. Land to north, east, and west of the site is used for residential housing and the area to the south for agricultural purposes.

Because of DOE's concern for the presence of large quantities of unencapsulated plutonium-238 in facilities that do not meet current plutonium facilities design criteria and which are near a large metropolitan area, a directive was issued to remove operations from Mound which involved large quantities of unencapsulated plutonium-238.

The ANSPD plutonium operations were located at Mound in portions of the Plutonium Processing (PP) Building, the Research (R) Building, and the Waste Transfer System (WTS). The plutonium-238 was processed for use as heat sources in the NASA space program. Operations ceased in FY 1977 and decommissioning operations were initiated in FY 1978 and are expected to be completed by FY 1988.

The Office of Military Applications (OMA) also processed plutonium-238 in the PP and R Buildings utilizing common processing facilities with ANSPD. Since the processing operations ceased, decommissioning operations were coordinated and funded jointly by ANSPD and OMA in areas of joint ownership to minimize duplication of efforts; effectively utilize resources; minimize environmental, safety, and health risks; follow a logical decommissioning sequence; and prevent shifting of last user cost responsibilities as agreed to in the NE/OMA Memorandum of Understanding. Funding responsibility for decommissioning the inactive ANSPD areas was assumed by the Office of Nuclear Energy - Waste Management in FY 1981.

The decommissioning effort in the PP and R Buildings is two-phased: 1) clean and remove equipment and services from affected gloveboxes, seal contamination, disconnect, and package the empty gloveboxes in approved waste containers for shipment and burial; and 2) perform extensive structural decontamination of the affected areas to remove or seal residual contamination.

The decommissioning effort on the WTS involves removal of approximately 5,000 linear feet of below-grade contaminated piping, dismantlement of an associated storage and pumping facility (Building 41) and the removal of contaminated soil.

Mound ANSPD Areas Decommissioning Project
Albuquerque Operations Office
Dayton Area Office

Total Project Cost Estimate (TPCE): $36,547,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

The intent of DOE's quality assurance program (DOE Order 5700.6A) is met with independent verification.

The four year projection (FY 1985-1988) contained in this document is balanced to minimize resource increases or decreases. This projection is coordinated with a level funding effort from OMA, so that, the combined projects will satisfy the intent of DOE by maximizing the effort and maintaining a safe and efficient decommissioning program.

Continued project plan funding eliminates an estimated $2,000,000 per year surveillance and maintenance cost and radiological risks to personnel and the environment associated with inactive contaminated areas. The decommissioned areas of PP and R Buildings will provide approximately 23,000 square feet of open areas for new or expanded laboratory/processing operations versus construction of new laboratories and buildings.

Some of the previously decommissioned laboratories are currently being reused by other DOE programs. Current uncommitted laboratory space at Mound is minimal.

(a) Schedule of Planned Activities

The following table presents the program broken down by primary tasks.

Activity	Start	Complete
PP Building Decommissioning	1st Qtr., FY 1978	4th Qtr., FY 1988
R Building Decommissioning	1st Qtr., FY 1978	4th Qtr., FY 1988
WTS Decommissioning	1st Qtr., FY 1982	4th Qtr., FY 1988

Mound ANSPD Areas Decommissioning Project
Albuquerque Operations Office
Dayton Area Office

Total Project Cost Estimate (TPCE): $36,547,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(b) Management and Contracting

Project management, technical, cost, and schedule management for the project is provided by DOE-Albuquerque Operations Office. Monsanto Research Corporation is the resident contractor at Mound performing the decommissioning operations.

(c) Prior Year Achievements

In the PP Building, equipment, piping, and services continued to be removed; structural decontamination was completed in 15 laboratories, and removal of the contaminated filtration system (filter banks) was initiated. In R Building, glovebox removal was completed in one laboratory and structural decontamination of two laboratories was completed. In the WTS, an additional 1,070 linear feet of underground lines were removed and Building 41 decommissioning efforts were continued with the removal of the above ground structure.

(d) Current Year Achievements

During FY 1986, the following activities are scheduled in the PP Building: equipment, piping, and services continue to be removed and structural decontamination will be completed in eight laboratories and several support rooms. In the R Building, structural decontamination will be initiated in the remaining two laboratories and support areas. In the WTS, Building 41 underground tanks will be removed and the remaining 225 linear feet of underground lines removed.

(e) Reasons for Increases and Decreases

The TPCE has been increased $517,000 from the FY 1986 Congressional Budget data sheet (TPCE = $36,030,000) to reflect year of expenditure dollars. The previously submitted data sheet reflected a TPCE in constant dollars.

Mound ANSPD Areas Decommissioning Project
Albuquerque Operations Office
Dayton Area Office

Total Project Cost Estimate (TPCE): $36,547,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimate	Total Cost
1. Operating Expenses:	
a. Decommissioning Operations	$ 34,104
2. Contingency @ approximately 15%	2,443
Total Estimated Cost	$ 36,547

Assumptions:

1. The TPCE assumes a constant level of funding at the current Surplus Facilities Management Program planning level. It also assumes that Nuclear Energy (NE) and the Office of Military Applications (OMA) will continue coordinated program plan funding in order to: effectively utilize resources in areas of joint ownership; follow a logical sequence of decommissioning activities; meet the intent of DOE directives to remove unencapsulated plutonium-238 from Mound; and to prevent shifting of last-user cost responsibilities as agreed to in the NE/OMA Memorandum of Understanding.

2. No funding is required for specific NEPA compliance, as a site-wide Environmental Impact Statement is applicable to this work.

3. The TPCE does not include the costs for maintenance and surveillance activities which may be required beyond completion of remedial actions.

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(Tabular dollars in thousands. Narrative material in whole dollars.)

Monticello Remedial Action and Vicinity Properties Project
Idaho Operations Office
Grand Junction Area Office

Total Project Cost Estimate (TPCE): $37,626,000
(For Engineering, Maintenance and Surveillance,
and Decommissioning Operations)

Monticello Remedial Action and Vicinity Properties Project
Idaho Operations Office
Grand Junction Area Office

Total Project Cost Estimate (TPCE): $37,626,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Actual			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Site characterization, engineering	$ 1,394	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
NEPA compliance	345	430	430	505	200	200	0	0
Design and engineering	0	250	250	204	805	851	200	200
Remedial action operations	0	0	0	0	0	0	1,980	1,980
Vicinity properties	481	470	470	666	500	594	600	600
Contingency	0	0	0	0	0	0	850	850
R&D related to construction	0	0	0	0	0	0	0	0
Facility operations	0	0	0	0	0	0	0	0
Direct project related support costs	0	0	0	0	0	0	0	0
Capital equipment	281	35	35	35	48	48	50	50
Total operating expenses	2,501	1,185	1,185	1,410	1,553	1,693	3,680	3,680
Other DOE funding:	0	0	0	0	0	0	0	0
Total DOE funding:	2,501	1,185	1,185	1,410	1,553	1,693	3,680	3,680
Non-DOE funding:	0	0	0	0	0	0	0	0
Total Project funding	$ 2,501	$ 1,185	$ 1,185	$ 1,410	$ 1,553	$ 1,693	$ 3,680	$ 3,680

Monticello Remedial Action and Vicinity Properties Project
Idaho Operations Office
Grand Junction Area Office

Total Project Cost Estimate (TPCE): $37,626,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Site characterization, engineering	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
NEPA	0	0	0	0	0	0
Design and engineering	0	0	0	0	0	0
Remedial action operations	3,563	3,563	3,465	3,465	3,852	3,852
Vicinity properties	236	236	0	0	0	0
Contingency	1,042	1,042	1,040	1,040	1,119	1,119
R&D related construction	0	0	0	0	0	0
Facility operations	0	0	0	0	0	0
Direct project related support costs	0	0	0	0	0	0
Capital equipment	54	54	58	58	62	62
Total operating expenses	4,895	4,895	4,563	4,563	5,033	5,033
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	4,895	4,895	4,563	4,563	5,033	5,033
Non-DOE funding:	0	0	0	0	0	0
Total Project funding	$ 4,895	$ 4,895	$ 4,563	$ 4,563	$ 5,033	$ 5,033

Monticello Remedial Action and Vicinity Properties Project
Idaho Operations Office
Grand Junction Area Office

Total Project Cost Estimate (TPCE): $37,626,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1991 Estimate		Thru Completion Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):					
Site characterization, engineering	$ 0	$ 0	$ 0	0	$ 1,394
NEPA compliance	0	0	0	0	975
Design and engineering	0	0	0	0	1,255
Remedial action operations	3,493	3,493	7,800	7,800	24,153
Vicinity properties	0	0	0	0	2,287
Contingency	870	870	1,950	1,950	6,871
R&D related to construction	0	0	0	0	0
Facility operations	0	0	0	0	0
Direct project related support costs	0	0	0	0	0
Capital equipment	67	67	36	36	691
Total operating expenses	4,430	4,430	9,786	9,786	37,626
Other DOE funding:	0	0	0	0	0
Total DOE funding:	4,430	4,430	9,786	9,786	37,626
Non-DOE funding:	0	0	0	0	0
Total Project funding:	$ 4,430	$ 4,430	$ 9,786	$ 9,786	$ 37,626

Monticello Remedial Action and Vicinity Properties Project
Idaho Operations Office
Grand Junction Area Office

Total Project Cost Estimate (TPCE): $37,626,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The inactive Monticello uranium processing millsite covers approximately 78 acres adjoining the southern limit of Monticello, Utah, townsite. The original mill was financed by the United States Government through its agent, the Defense Plant Corporation, to provide additional sources of vanadium needed during World War II. The Vanadium Corporation of America operated the mill for the Government from 1943 until 1946. The U.S. Atomic Energy Commission (AEC) reactivated the mill in 1948. It was rebuilt and operated for the AEC from 1949 to 1956 by the Galigher Company, and from 1956 through 1959 by the National Lead Company under cost-type contracts to produce both uranium and vanadium.

Mill operations were terminated on January 1, 1960, and the plant was dismantled and excessed by the end of 1964. The mill tailings piles were stabilized from 1961 to 1962, and during 1974-1975 the ore stockpile areas were cleaned up and the mill foundations were buried. In 1975-1976, an additional layer of soil was placed over the tailing piles to prevent further use of the materials as backfill on Monticello private properties. Further remedial actions will be required to bring the millsite's condition to present-day standards of contamination and reclamation.

Initially, the Monticello mill produced vanadium and disposed of the associated uranium in the mill tailings. From 1944 to 1946, the mill produced a uranium-vanadium sludge which was sold to the Manhattan Engineer District for further refining.

Uranium became the Monticello mill's primary product in 1949 when carbonate leaching and yellow cake precipitation and purification stages were added to the original salt roast process which previously had recovered vanadium only.

It is estimated that during its AEC operations, the Monticello mill processed approximately 900,000 tons of ore and produced about 4.6 million pounds of uranium yellow cake. A recent engineering study estimates the amount of tailings and tailings-contaminated material at the Monticello site to be 1.6 million tons, with an additional 400,000 tons of contaminated substrate. Up to 400,000 tons of contaminated material also exists around the millsite as a result of operations related directly to the mill's operations (i.e., windblown and waterborne tailings, ore buying stations, etc.).

Monticello Remedial Action and Vicinity Properties Project
Idaho Operations Office
Grand Junction Area Office

Total Project Cost Estimate (TPCE): $37,626,000

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An undetermined volume of contaminated material derived from the millsite was also used for construction purposes throughout the town. Forty-seven properties are currently authorized by DOE for remedial action.

The Monticello Remedial Action Project (MRAP) was accepted into the Surplus Facilities Management Program (SFMP) in 1980 with the task of planning and performing remedial action for the inactive uranium millsite, and vicinity properties in Monticello, Utah.

The Monticello Vicinity Properties Project (MVP) was accepted into the SFMP in 1984 with the task of performing remedial action constructions on contaminated properties in Monticello, Utah.

The primary objective of the project is to eliminate the potential hazard to the public due to long-term exposure to low-level radioactivity and surface and subsurface water contamination associated and derived from the inactive Monticello uranium millsite. A secondary objective is to restore the millsite to a condition that may permit other productive use of the property. It is intended that contaminated materials from the Monticello millsite will be managed and disposed of so as to conform with the appropriate standards.

(a) Schedule of Planned Activities

The following table presents the total project schedule broken down by major activities:

Activity	Start	Complete
Site characterization, engineering	1st Qtr., FY 1981	4th Qtr., FY 1984
NEPA compliance	4th Qtr., FY 1984	3rd Qtr., FY 1986
Design Engineering	4th Qtr., FY 1985	1st Qtr., FY 1987
Remedial Actions	1st Qtr., FY 1987	4th Qtr., FY 1993
Vicinity Properties	2nd Qtr., FY 1984	4th Qtr., FY 1987

(b) Management and Contracting

The DOE Grand Junction Projects Office (GJPO) is responsible for the project management, technical support, and characterization activities. NEPA compliance, design engineering, and support and remedial action activities will be handled by GJPO and appropriate subcontractors. GJPO is also responsible for project management and radiologic engineering assessments for the vicinity properties. Remedial actions construction will be handled by appropriate subcontractors.

(c) Prior Year Achievements

MRAP - During FY 1985 a Final Site Analysis Report (SAR) was completed. It documents the current hydrogeotechnical status of the site and its impact on health and environment. A cost/benefit analysis with primary design concepts compares all the remedial action alternatives. Based on an Action Description Memorandum referencing the SAR and DOE guidelines regarding NEPA compliance, the DOE Assistant Secretary for Policy, Safety and Environment has determined that preparation of an Environment Assessment is appropriate for MRAP. The NEPA compliance documentation was initiated in 1984 and continued through 1985. Further characterizations based on comments from Headquarters on the SAR were implemented in FY 1985. Peripheral properties which were contaminated as a result of offsite windblown and waterborne contamination were characterized. A temporary measure to retard tailings piles saturation, by constructing an interceptor ditch, was completed. The areal hydrologic regime was confirmed. Engineering and environmental monitoring activities continued. A draft Environmental Assessment was scheduled for completion in FY 1985.

MVP - Of the 47 vicinity properties authorized for remedial action, Radiological and Engineering Assessments were scheduled to be completed on 35 properties and 22 remedial action constructions were scheduled to be completed by the end of FY 1985.

(d) Current Year Achievements

MRAP - A final Environmental Assessment is scheduled for completion in early FY 1986. All engineering design efforts are scheduled for completion in FY 1987 and an operating and decommissioning plan in preparation for remedial action construction will be finalized. The remedial action construction activities will be initiated in FY 1987. All property acquisitions and permitting necessary for remedial action will be accomplished. Radiation control and construction monitoring will be implemented. Remedial action activities will be initiated and the peripheral properties decontamination will be accomplished. The construction activities will include excavation of contamination, transportation of contaminated material to the disposal site, and replacement of material with clean fill including restoration of the peripheral properties.

MVP - Remedial action is scheduled to be completed on 7 authorized vicinity properties in FY 1986. In addition, Radiologic and Engineering Assessments are scheduled to be completed for all currently identified vicinity properties. Action on all remaining properties, including all completion and certification documents, is scheduled for completion in early FY 1988.

(e) Reasons for Increases and Decreases

The TPCE for this project has increased by $12,326,000 from the FY 1986 Congressional Budget (TPCE = $25,300,000) data sheet because:

MRAP - As a result of the peripheral property characterization that was completed in FY 1984-85, it was determined that there is approximately 400,000 tons of contaminated material around the millsite directly related to the mill's operations (i.e., windblown and waterborne tailings, ore buying stations, etc.). The cleanup of these peripheral properties increased the cost by approximately $6,000,000 and lengthened the schedule of the MRAP Project.

MVP - Additional costs will also be incurred on the vicinity properties activity, approximately $500,000. The initial remedial action construction experience in FY 1984-1985 proved that a greater than anticipated volume of contamination exists at these properties and resulted in an increase in costs and extended the schedule through FY 1988.

The previously submitted data sheet was done in constant dollars. This data sheet has been revised to reflect year of expenditure dollars, an increase of approximately $5,800,000.

Monticello Remedial Action and Vicinity Properties Project
Idaho Operations Office
Grand Junction Area Office

Total Project Cost Estimate (TPCE): $37,626,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimate

	Item Cost	Total Cost
1. Operating expenses:	$	$ 30,064
a. Site characterization, engineering	1,394	
b. NEPA compliance	975	
c. Design engineering	1,255	
d. Millsite remedial action	24,153	
e. Vicinity properties remedial action	2,287	
2. Capital equipment		691
3. Contingency @ approximately 20 percent		6,871
Total Estimated Cost		$ 37,626

Assumptions

1. Based on a Site Analysis survey evaluating three (3) viable options for remedial action on the Monticello Millsite, it was determined that "tailings stabilization in place" would be the most cost beneficial method of eliminating the chronic low-level radiation levels and groundwater contamination for the foreseeable future. However, this does not include active groundwater restoration. If this alternative is selected by DOE, following appropriate NEPA procedures, the Total Project Cost Estimate (TPCE) would be $37,626,000. The other viable options evaluated were alternate site disposal and recovery of residual values:

	Cost Range
a. Alternate Site Disposal	$ 50,000,000 to $ 70,000,000
b. Recovery of Residual Value	$ 70,000,000 to $120,000,000

2. Contingency is included at approximately 20 percent due to the large uncertainty in soil contamination.

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(Tabular dollars in thousands. Narrative material in whole dollars.)

Shippingport Station Decommissioning Project
Shippingport, Pennsylvania

Total Project Cost Estimate (TPCE) $98,300,000
(For Engineering, Maintenance and
Surveillance, and Decommissioning Operations)

Shippingport Station Decommissioning Project
Shippingport, Pennsylvania

Total Project Cost Estimate (TPCE) $98,300,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Actual			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Engineering & decommissioning								
Conceptual engineering	$ 540	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Engineering	5,460	0	0	0	0	65	0	0
Decommissioning operations	0	14,214	14,214	9,318	20,203	17,830	19,918	17,365
Contingency	0	1,401	1,401	0	2,392	2,684	1,972	2,605
R&D related to construction	0	0	0	0	0	0	0	0
Facility operations	0	0	0	0	0	0	0	0
Direct project related support costs	0	0	0	0	0	0	0	0
Capital equipment	0	0	0	0	0	0	0	0
Total operating expenses	$ 6,000	$ 15,615	$ 15,615	$ 9,318	$ 22,595	$ 20,579	$21,890	$ 19,970
Other DOE funding:								
Maintenance & Surveillance	3,250	0	0	1,071	0	0	0	0
Total DOE funding:	9,250	15,615	15,615	10,389	22,595	20,579	21,890	19,970
Non-DOE funding:	0	0	0	0	0	0	0	0
Total Project funding	$ 9,250	$ 15,615	$ 15,615	$ 10,389	$ 22,595	$ 20,579	$ 21,890	$ 19,970

Shippingport Station Decommissioning Project
Shippingport, Pennsylvania

Total Project Cost Estimate (TPCE) $98,300,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Engineering & decommissioning							
Conceptual engineering	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 540
Engineering	0	0	0	0	0	0	5,460
Decommissioning operations	13,548	17,762	8,950	14,121	1,437	1,875	78,270
Contingency	2,452	2,664	1,050	1,314	1,513	1,513	10,780
R&D related to construction	0	0	0	0	0	0	0
Facility operations	0	0	0	0	0	0	0
Direct project related support costs	0	0	0	0	0	0	0
Capital equipment	0	0	0	0	0	0	0
Total operating expenses	$ 16,000	$ 20,426	$ 10,000	$ 15,435	$ 2,950	$ 3,388	$ 95,050
Other DOE funding:							
Maintenance & Surveillance	0	0	0	0	0	0	3,250
Total DOE funding:	16,000	20,426	10,000	15,435	2,950	3,388	98,300
Non-DOE funding:	0	0	0	0	0	0	0
Total Project funding	$ 16,000	$ 20,426	$ 10,000	$ 15,435	$ 2,950	$ 3,388	$ 98,300

Shippingport Station Decommissioning Project
Shippingport, Pennsylvania

Total Project Cost Estimate (TPCE) $98,300,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Shippingport Atomic Power Station (Station) is located on the south bank of the Ohio River in the borough of Shippingport, Beaver County, Pennsylvania, on part of a 486.8-acre tract of land owned by the Duquesne Light Company (DLC). The Station used a pressurized water reactor to generate steam, and was the first nuclear plant in the United States to be used by a public utility to produce electricity. The nuclear reactor portion of the Station operated from 1957 to 1982 under supervision of the Department of Energy (DOE), Office of the Deputy Assistant Secretary for Naval Reactors (NR). The third and final core installed was of the light water breeder reactor (LWBR) type. The Station was shutdown and permanently disconnected from the power grid on October 1, 1982, after sufficient data from the LWBR core had been obtained. Following a planned period of defueling and end-of-life testing, the Station was transferred in September 1984, to the Office of Terminal Waste Disposal and Remedial Action Programs, DOE-HQ, for decommissioning. The decommissioning mode has been officially selected as prompt removal/dismantlement based primarily on the NEPA process. That mode is the basis for this request.

The purpose of the Shippingport Station Decommissioning Project (SSDP) is to place the Station in a long-term radiologically safe condition following defueling of the reactor (as agreed by the Government in contract #E(36-1)-292 with DLC), to demonstrate to the nuclear industry the practical and affordable dismantlement of a large nuclear power plant, and to provide useful data for future decommissioning projects. The Station was the first large scale central station nuclear power plant in the United States and was funded jointly by a predecessor agency to DOE (Atomic Energy Commission) and the Duquesne Light Company of Pittsburgh. It was operated for DOE-NR by the Duquesne Light Company. Decommissioning of the Station is the final phase of this long term reactor development and demonstration program. The SSDP will make the nuclear portion of the Station radiologically safe, and will remove government-owned portions of the plant including components and equipment. Thus, the SSDP directly supports DOE's mission by demonstrating the economic and technical feasibility of decommissioning a commercial nuclear power plant. The SSDP will be accomplished with minimum environmental impact and will result in restoring the reactor site radiologically to unrestricted use. The prompt removal/dismantling mode is the most cost-effective mode.

Shippingport Station Decommissioning Project
Shippingport, Pennsylvania

Total Project Cost Estimate (TPCE) $98,300,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the total program broken down by primary tasks.

Activity	Start	Complete
Conceptual Engineering	2nd Qtr., FY 1979	1st Qtr., FY 1981
Design Engineering	1st Qtr., FY 1981	4th Qtr., FY 1983
Follow-on Design Engineeri.	1st Qtr., FY 1984	3rd Qtr., FY 1984
Maintenance & Surveillance	4th Qtr., FY 1984	4th Qtr., FY 1985
Decommissioning	4th Qtr., FY 1985	1st Qtr., FY 1990
Project Completion/Site Release		2nd Qtr., FY 1990

(b) Management and Contracting

Project management is provided by DOE-Richland Operations Office (RL). Technical, cost and schedule management support for the project is provided by UNC Nuclear Industries (UNC). Burns and Roe Industrial Services Corporation (BRISC), with Nuclear Energy Services, Inc. (NES) as principal subcontractor, performed the engineering services for the planning of the SSDP under contract to RL. The General Electric Company, with Morrison-Knudsen as a principal subcontractor, was selected as the Decommissioning Operations Contractor (DOC) and is responsible for management and performance of physical decommissioning.

(c) Prior Year Achievements

The mission need, project objective, and initiative of project activity was approved on November 2, 1979. The final Environmental Impact Statement (EIS) was approved in May 1982. The Department selected the prompt dismantlement mode for decommissioning in August 1982 and announced this decision in the Federal Register.

Conceptual and design engineering was completed by October 1983 and follow-on design engineering was completed in the third quarter of FY 1984. The process to competitively select the DOC was completed in FY 1983 and a contract was entered into in FY 1984. The maintenance and surveillance period began in FY

1984 and was completed at the end of the first quarter of FY 1985. DOE, UNC, and GE project personnel relocated to the Shippingport Site in FY 1984, to initiate site and project management activities. In FY 1985 detailed engineering, planning, and preparation of bid specifications for initial subcontracted activities were initiated by GE. DOC and subcontractor tasks specific to preparation of the site for decommissioning were started; miscellaneous decontamination work began; and physical decommissioning was initiated by removal of: several primary system components, asbestos insulation, and plant water inventory.

(d) Current Year Achievements

In FY 1986, asbestos removal, transfer of irradiated components and site preparations will be completed. DOC subcontractors will continue removal of the primary components with piping and equipment removal work following close behind. Plant water inventory will continue to be processed and discharged, and decontamination work will continue on an as-required basis.

(e) Reasons for Increases and Decreases

No change from previously submitted FY 1986 schedule 47.

Shippingport Station Decommissioning Project
Shippingport, Pennsylvania

Total Project Cost Estimate (TPCE) $98,300,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimate

	Item Cost	Total Cost
1. Operating Expenses: Design and Construction (Engineering and Decommissioning)	$	$ 84,270
a. Conceptual Engineering	540	
b. Engineering	5,460	
c. Procurement	562	
d. Decommissioning Operations	77,708	
2. Contingency @13.8% of decommissioning operations and procurement (items 1.c. and 1.d.)		10,780
3. Maintenance and Surveillance		3,250
Total Estimated DOE Cost		$ 98,300

Assumptions

1. The TPCE assumes completion of physical decommissioning in the 1st quarter FY 1990 and all effort completed in the 2nd quarter FY 1990.

2. Assumed labor rates in the TPCE are based on Department of Labor (DOL) wage determinations that are subject to a current DOL area wage survey. There is a high probability that wages associated with Service Contract Act work will increase significantly. This would result in a major change to the TPCE.

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Remedial Action and Waste Technology

(Tabular dollars in thousands. Narrative material in whole dollars.)

West Valley Demonstration Project
West Valley, New York

Total Project Cost Estimate (TPCE)
Phase I: $442,370,000 a/
Phase II: TBD b/

a/ Phase I costs include project development, design construction, operating, and decontamination and decommissioning activities through waste solidification. Project cost stated in year of expenditure dollars (TPCE in constant FY 1985 dollars is $366,000,000; corresponds to TPCE of $286,000,000 in September 1980 dollars, date of enactment of P.L. 96-368.) The TPCE revised from previous estimate of $436,330,000 to accommodate revised FY 1987 availability.

b/ Phase II costs include post-solidification operating, high-level waste storage and transportation, and final decontamination and decommissioning activities. A definitive estimate for the post-solidification phase (e.g., waste storage and transportation and final decontamination and decommissioning) will be prepared after coordination with the Nuclear Regulatory Commission and the State of New York and preparation of appropriate environmental documents. A preliminary, scoping cost estimate for the post-solidification phase is being prepared and the estimated range of costs is between $250,000,000 and $350,000,000, depending on decommissioning alternative selected.

West Valley Demonstration Project
West Valley, New York

Total Project Cost Estimate (TPCE): $442,370,000 a/

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Estimate			FY 1986 Estimate		FY 1987 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):								
Waste solidification	$ 20,550	$ 21,450	$ 21,450	$ 21,450	$ 29,781	$ 29,781	$ 33,750	$ 33,750
Decontamination and decommissioning	7,100	5,410	5,410	5,410	4,670	4,670	4,300	4,300
Site operations	15,832	9,080	9,080	9,080	10,900	10,900	12,450	12,450
Direct project related support costs	6,110	2,440	2,440	2,440	2,950	2,950	3,500	3,500
Low-level and TRU waste handling	9,170	8,770	8,770	8,770	13,280	13,280	25,000	25,000
Total operating expenses	58,762	47,150b/	47,150	47,150	61,581	61,581	79,000	79,000
Other DOE funding:								
Capital equipment	1,200	0	0	0	0	0	0	0
General plant projects	1,500	0	0	0	0	0	0	0
Total DOE funding:	61,462	47,150	47,150	47,150	61,581	61,581	79,000	79,000
Non-DOE funding: c/								
NYSERDA	953	1,175	1,175	1,175	2,600	2,600	3,160	3,160
Total Project funding	$ 62,415	$ 48,325	$ 48,325	$ 48,325	$ 64,181	$ 64,181	$ 82,160	$ 82,160

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a/ Does not include post-solidification (e.g., waste storage and transportation and final decontamination and decommissioning) costs

b/ Reduction from the FY 1985 Appropriation of $49,400,000 due to general reduction ($1,500,000) and management initiative ($750,000).

c/ Represents an estimate of project activities funded by the New York State Energy Research and Development Authority (NYSERDA). Other NYSERDA contributions include value of Western New York Nuclear Service Center and NYSERDA services.

West Valley Demonstration Project
West Valley, New York

Total Project Cost Estimate (TPCE): $442,370,000 a/

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate		Total Cost a/
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):							
Waste solidification	$ 27,200	$ 27,200	$ 21,220	$ 21,220	$ 11,659	$ 11,659	$165,610
Decontamination and decommissioning	6,610	6,610	6,600	6,600	6,700	6,700	41,390
Site operations	15,380	15,380	17,800	17,800	17,000	17,000	98,442
Direct project related support costs	3,550	3,550	3,580	3,580	4,580	4,580	26,710
Low-level and TRU waste handling	9,960	9,960	11,100	11,100	8,150	8,150	85,430
Total operating expenses	62,700	62,700	60,300	60,300	48,089	48,089	417,582
Other DOE funding:							
Capital equipment	0	0	0	0	0	0	1,200
General plant projects	0	0	0	0	0	0	1,500
Total DOE funding:	62,700	62,700	60,300	60,300	48,089	48,089	420,282
Non-DOE funding: b/							
NYSERDA	5,790	5,790	5,240	5,240	3,170	3,170	22,088
Total Project funding	$ 68,490	$ 68,490	$ 65,540	$ 65,540	$ 51,259	$ 51,259	$442,370

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a/ Does not include post-solidification (e.g. waste storage and transportation and final decontamination and decommissioning) costs

b/ Represents an estimate of project activities funded by the New York State Energy Research and Development Authority (NYSERDA). Other NYSERDA contributions include value of Western New York Nuclear Service Center and NYSERDA services.

West Valley Demonstration Project
West Valley, New York

Total Project Cost Estimate (TPCE): $442,370,000 a/

(Tabular dollars in thousands. Narrative material in whole dollars.)

Project Cost Sharing Estimate

Total Project Cost Estimate:

Department of Energy	$420,282
New York State direct expenditures and cash payments of the Project	22,088
Total Project Cost Estimate	$442,370 a/

New York State Contribution:

(a) Design, construction, etc. (direct expenditures and cash payments)	$ 22,088
(b) New York State Energy Research and Development Authority Credit and Services	24,500 b/
Total NYSERDA Contribution	$ 46,588 c/

Description, Objective and Justification

Public Law 96-368, West Valley Demonstration Project Act of 1980, directed the Department of Energy to carry out a high-level liquid nuclear waste management demonstration project at the Western New York Nuclear Service Center near West Valley, New York, for the purpose of demonstrating the solidification and preparation of high-level radioactive waste for disposal. By virtue of demonstrating the solidification of liquid high-level wastes, the hazards associated with continued storage of the liquid waste at the Center will be eliminated.

The Center reprocessed nuclear fuel from 1966 to 1972. During that time, approximately 560,000 gallons of alkaline high-level waste was generated by this activity and stored in a carbon steel tank located in an underground vault. The alkaline waste is similar to that stored at the Department's Savannah River and Hanford sites in that these wastes also consist of a supernatant liquid and a sludge that has formed on the

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a/ Does not include post-solidification (e.g., waste storage and transportation and final decontamination and decommissioning) costs.

b/ Includes Facility Credit of $16,100,000; other Authority Services total $8,400,000.

c/ Elements that make up the Total Cost per Cooperative Agreement total $465,370,000 (i.e., DOE and NYSERDA Direct Costs, Facility Credit, and Other Authority Services). NYSERDA's 10 percent share is $46,588,000.

tank bottom. A smaller amount (about 12,000 gallons) of acidic Thorex waste, stored in a stainless steel tank located in a separate underground concrete vault, will also be treated. The project scope includes all activities undertaken in carrying out the solidification, including: (1) preparation of the Center's premises and facilities to accommodate the solidification project, including such decontamination of existing facilities and equipment as may be necessary or appropriate; (2) removal of the wastes from the underground storage tanks; (3) development, design, construction, and operation of systems and necessary supporting facilities for the solidification of the wastes; (4) acquisition of containers for the permanent disposal of the solidified waste; (5) temporary storage of the solidified waste followed by transportation to an appropriate Federal repository for permanent disposal; (6) decontamination and decommissioning (D&D) of the waste tanks and facilities, material, and hardware used in carrying out the solidification of the wastes; and (7) disposal of low-level and transuranic wastes produced from project activities.

Since existing facilities and utilities will be used to support this project, site improvements and utility (water, electrical, and sewer) upgrading will be minimal. Utilization of existing facilities will be maximized and new construction kept to a minimum consistent with programmatic, environmental, health, and safety needs. A limited amount of new facilities and modifications and/or additions to existing facilities are included to accommodate installation and operation of the solidification equipment and to provide necessary office space and support for these activities.

Operating expense funds will be used to fund development, design, construction, site/facility operation, and decontamination and decommissioning activities associated with the project.

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a/ Does not include post-solidification (e.g., waste storage and transportation and final decontamination and decommissioning) costs.

West Valley Demonstration Project
West Valley, New York

Total Project Cost Estimate (TPCE): $442,370,000 a/

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities b/

Activity	Start	Complete
Design, procurement and fabrication of Component Test Stand	2nd Qtr. FY 1983	4th Qtr. FY 1985
Component Test Stand operation	4th Qtr. FY 1985	4th Qtr. FY 1986
Supernatant Processing	1st Qtr. FY 1987	1st Qtr. FY 1988
Upgrade test stand for radioactive operation	4th Qtr. FY 1985	3rd Qtr. FY 1988
Vitrification facility checkout and cold operation	3rd Qtr. FY 1988	1st Qtr. FY 1989
Vitrification of high-level waste	2nd Qtr. FY 1989	4th Qtr. FY 1990
Post-vitrification decontamination and decommissioning	3rd Qtr. FY 1990	Open

(b) Management and Contracting

The project is managed for the Department by an onsite project office, reporting through the Idaho Operations Office, which is responsible for the day-to-day management and decisionmaking. An operating contractor (West Valley Nuclear Services Company, Inc., a wholly owned subsidiary of Westinghouse Electric Corporation) is responsible for the technical management of the high-level waste solidification related activities, site and facility operations, and decontamination and decommissioning. Approval by the Department's Field, Project and Headquarters Offices is required on matters affecting project policies and technical, cost, and schedule baselines. The State of New York through the New York State Energy Research and Development Authority provides consultation and comment on project activities to the Department as required by the West Valley Demonstration Project Act and the cooperative agreement between the Department and the Authority. An architect/engineering (A/E) firm (Ebasco Services, Inc.) has been selected by the operating contractor to perform miscellaneous A/E services; the Department reviewed and

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a/ Does not include post-solidification (e.g., waste storage and transportation and final decontamination and decommissioning) costs.

b/ Based on reference schedule, solidification is anticipated to take about 18 months beginning in FY 1989 followed by completion of decontamination and decommissioning activities in the early 1990's.

West Valley Demonstration Project
West Valley, New York

Total Project Cost Estimate (TPCE): $442,370,000 a/

(Tabular dollars in thousands. Narrative material in whole dollars.)

approved the selection process and contract terms. The architect-engineer scope of work generally includes preliminary and final design. To the extent feasible, design, procurement, construction, and inspection will be by fixed-price contract and subcontracts awarded on the basis of competitive bids. However, due to the complexity of the work, it may be necessary to utilize cost plus fixed fee contracts for portions of the work. Award fee contracts will be used when justified. Contracting will be by the Department or the operating contractor, depending on the nature and scope of work. The project is supported by the Battelle Pacific Northwest Laboratory, Richland, Washington, for development activities required to adapt waste treatment and solidification technology for the specific West Valley situation.

(c) Prior Year Achievements

The delivery of the melter/turntable was completed and services installed. The melter/turntable was operational in December 1984 and produced a full-scale, simulated test canister. An evaluation of the alternate locations for the vitrification system was completed and the design for the upgrades necessary to convert the Component Test Stand for radioactive operation was initiated. The test stand was operated using simulated West Valley waste compositions to verify component performance and to provide samples for product qualification. Installation and checkout of equipment for the liquid low-level waste cement solidification system were completed. Design of the balance of the liquid low-level waste treatment system was completed and procurement and installation of components were initiated. Final design of the supernatant treatment and waste transfer systems was completed. Procurement of all major supernatant treatment equipment was begun. Testing of waste removal equipment in the 1/6 scale waste tank model continued. The waste vitrification development program will focus on verification of applicable technology with emphasis on the following areas: completion of supernatant and sludge sampling and characterization, demonstration of waste form behavior, interaction with the Office of Civilian Radioactive Waste Management on waste disposal criteria and specifications, and testing to ensure acceptability of the West Valley immobilized waste.

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a/ Does not include post-solidification (e.g., waste storage and transportation and final decontamination and decommissioning) costs.

West Valley Demonstration Project
West Valley, New York

Total Project Cost Estimate (TPCE): $442,370,000 a/

(Tabular dollars in thousands. Narrative material in whole dollars.)

(d) Current Year Achievements

Scale model equipment testing will continue in FY 1986 and design for sludge mobilization will be completed. High-level waste (HLW) transfer piping and monitoring systems from waste tanks 8D-2 and 8D-4 to the Component Test Stand, and pump/piping connection arrangement for the containment pit will be designed in FY 1986. All major procurements for supernatant treatment will be received and modifications to existing facilities will be completed in fourth quarter FY 1986. System operation is scheduled to begin in March of 1987. Decontamination of cell areas needed for the liquid radioactive waste treatment system equipment will be completed in the first quarter FY 1986 in preparation for modifications and installation. Equipment procurement and installation/checkout will support an FY 1987 system startup of the liquid radioactive waste treatment system. Removal of jumpers and vessels from the Chemical Process Cell will be finished. Major refurbishment work in the Fuel Receiving and Storage Area will begin in the fourth quarter of FY 1986 to support installation of size reduction and TRU decontamination systems. Cement solidification will be operational and civil construction and equipment procurement for supernatant treatment and liquid waste treatment to support sludge mobilization and vitrification in FY 1987 and 1989, respectively, will be completed.

(e) Reasons for Increase and Decreases

The FY 1985 and FY 1986 Congressional data sheet showed a Phase I total project estimate of $472,800,000. The FY 1987 request shows a reduction in the Total Project Cost Estimate of approximately $30,000,000. Revised FY 1987 budget availability has led to a further revision with the current estimate now being $442,370,000.

(f) Cost Estimate

The costs shown are based on planned expenditures through FY 1990. A baseline cost and schedule estimate through waste solidification has been prepared. These current estimates include the following types of costs associated with the West Valley project: development, design, construction, waste immobilization,

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a/ Does not include post-solidification (e.g., waste storage and transportation and final decontamination and decommissioning) costs.

West Valley Demonstration Project
West Valley, New York

Total Project Cost Estimate (TPCE): $442,370,000 a/

(Tabular dollars in thousands. Narrative material in whole dollars.)

decontamination and decommissioning of existing hot cells for project reuse, site/facility operation and maintenance, project management, and low-level and transuranic waste handling. The cost estimate will be updated to include final decontamination and decommissioning (D&D), HLW transportation, and other activities when sufficient information is available.

	Total Cost 1/
High-Level Waste Solidification	$171,509
Decontamination and Decommissioning	47,656
Site operations	109,892
Direct Project Related Support	26,710
Low-level and TRU Waste Handling	83,903
Capital Equipment	1,200
General Plant Projects	1,500
Total Project Cost Estimate	$442,370

High-Level Waste Solidification

This category provides for development, design, construction, and operating activities related to immobilization and preparation of the high-level waste for permanent disposal.

(1) Development - includes confirmatory of prototype development program, including Component Test Stand and mockups. This activity is based on adapting existing technology from the base Nuclear Energy and Defense waste management programs to meet specific West Valley requirements.

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a/ Does not include post-solidification (e.g., waste storage and transportation and final decontamination and decommissioning) costs.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW
Civilian Radioactive Waste Research and Development

This overview document describes the Civilian Radioactive Waste Research and Development (R&D) program within the Department of Energy. The Civilian Radioactive Waste R&D program provides for encouraging and expediting the availability of licensed new at-reactor storage technologies. As required by the Nuclear Waste Policy Act (NWPA), the program objectives are to be accomplished through the use of Federal funds appropriated to the Secretary to carry out existing legislative R&D activities; as well as those established by Sections 135, 136, 218 and 223 of the NWPA. No funds are requested for research and development concerning alternatives for the permanent disposal of high-level radioactive wastes, including subseabed methods. Accordingly, activities to implement Section 222 of the NWPA will be terminated after FY 1986.

Implementation Strategy

The Department's Spent Fuel Storage Development subprogram efforts are to utilize all means directed or available through the Act or other authority to encourage and expedite the most efficient use of existing storage facilities and the addition of new capacity in a timely fashion. The primary means for accomplishing this under the Act are:

(1) To establish, in cooperation with the private sector, a demonstration program for the dry storage of spent nuclear fuel at civilian nuclear power reactor sites with the objective of establishing one or more technologies that the Nuclear Regulatory Commission (NRC) may, by rule, approve for use by the industry, [Section 218(a)].

(2) To undertake a cooperative program with the private sector to encourage the development of spent fuel rod consolidation technologies in existing power reactor water storage basins, [Section 218(a)].

(3) To provide consultative and technical assistance on a cost sharing basis to the private sector for the design support and generic licensing documentation required by the Nuclear Regulatory Commission (NRC) to permit construction authorization and licensing for onsite dry storage technologies, [Section 218(a)].

(4) To establish a cost shared development program at Federal facilities for not more than 300MT of spent fuel to collect necessary data to assist the utilities involved in the licensing process, [Section 218(c)(1)].

(5) To provide generic research and development of alternative spent nuclear fuel storage technologies to enhance utility provided, at-reactor storage capabilities, [Section 218(b)(3)].

(6) To cooperate with Non-Nuclear Weapon States (NNWS) by providing technical assistance in the field of spent fuel storage [Section 223].

(7) To provide the planning for full cost recovery program for the Federal Interim Storage (FIS) of not more than 1900 metric tons of storage capacity which could be activated if requested by an owner or operator of a power reactor and upon a determination by the NRC that despite diligent pursuit of licensed alternatives, adequate storage capacity cannot be found and the continued orderly operation of the reactor plant is threatened, [Section 135 and 136].

Highlights

Some of the near-term highlights and accomplishments of the Civilian Radioactive Waste R&D program are segregated by the three major subprograms which are summarized below for the Spent Fuel Storage Development Subprogram and Alternate Disposal Concepts Subprogram in FY 1986; and for the Spent Fuel Storage Development Subprogram in FY 1987:

FY 1985 accomplishments include:

Spent Fuel Storage Development

- Initiated dry storage cooperative demonstration and testing at Idaho National Engineering Laboratory (INEL) for the DOE/Virginia Power (VP) program for dry storage cask demonstration and loaded a dry storage cask at INEL with 21 spent fuel assemblies shipped from VP-Surry Power Plant.
- Installed rod consolidation equipment at Brown's Ferry fuel storage pool as part of the interagency agreement with the Tennessee Valley Authority (TVA) for an in-pool rod consolidation demonstration.
- Participated in international activities with the International Atomic Energy Agency (IAEA), Nuclear Energy Agency (NEA) and under an existing bilateral bilateral agreement with the Federal Republic of Germany (FRG).
- Provided support to Carolina Power and Light for their license application to the NRC.
- Activities were initiated at INEL to store and monitor the transportable, dry storage casks being used in the cooperative demonstration with the Nuclear Fuel Services, Inc.
- Completed cask characterization tests with intact fuel in inert cover gas for a DOE owned REA 2023 Storage Cask.
- Issued annual update of Spent Fuel Storage Requirements Report.
- Issued annual update of Federal Interim Storage fee charges and deployment plans.
- Applied to NRC for certification of casks for the shipment of Nuclear Fuel Services (NFS) fuel at West Valley to INEL.
- Cooperated with several NNWS by providing them with information in the area of spent fuel storage.

Alternative Disposal Concepts

- Issued working radiologic guidelines and standards for systems analysis of radiological safety of subseabed disposal.
- Completed construction of the In Situ Heat Transfer Experiment test platform and components and demonstrated its deployment and recovery in preparation for FY 1986 in situ tests.
- Completed the analysis of sediments acquired by the Deep Sea Drilling Program from two North Pacific site study areas.

- Completed the field data collection of geophysical characteristics of the two Atlantic site study areas.
- Completed the planning and construction of a test rig for assessment of hole self-closure following emplacement of containers in the subseabed.
- Completed plans for subseabed sediment deep core samples to characterize deep sediments.
- Participated in the NEA Seabed Working Group.
- Completed biological and ocean models for migration of radionuclides by acquiring geotechnical and biological samples of the potential sites to confirm models.

Generic Methods and Supporting Studies

- Submitted the final report on alternative approaches to managing the construction and operation of all civilian radioactive waste management facilities to Congress, otherwise known as the AMFM panel report.
- Updated and reissued through 1987, the required annual notice offering technical assistance to nonnuclear weapon states.
- Cooperated with NNWS in the area of waste disposal.
- Continued research under university research and fellowship programs, and coordinated ongoing and completed research with appropriate technical staff to incorporate into technical base of waste management activities.
- Supported efforts of other governmental agencies and independent groups that are relevant to technical and programmatic activities in the areas of spent fuel storage and waste disposal.

Expected FY 1986 accomplishments include:

Spent Fuel Storage Development

- The completion of the licensed construction and use of horizontal silo dry storage modules at Carolina Power and Light's H.B. Robinson site under the cooperative program.
- Complete the loading of two dry storage casks at INEL with the Virginia Power spent fuel.
- Complete the shipping and receiving of two dual purpose, transportable, dry storage casks at INEL. These casks will be NRC certified.
- Publish the documentation on the technical basis for the licensing of dry storage of spent fuel in an air atmosphere.
- Complete the consolidation of several assemblies owned by Rochester Gas and Electric and stored at the West Valley Pool. These consolidated assemblies will be shipped back to the RG&E Ginna plant for storage.
- Complete the documentation required for NRC evaluation and qualification of computer codes to predict thermal behavior of spent fuel in dry storage casks.

- Complete installation of new equipment and verification of existing facilities at INEL for the dry rod consolidation activities associated with the VP cooperative program.
- Issue the annual update of Spent Fuel Storage Requirements Report.
- Issue Federal Interim Storage Deployment Report.
- Publish the annual Federal Interim Storage Fee Schedule in the Federal Register.
- Continue cooperative activities for information exchange on spent fuel storage with the non-nuclear weapon states.
- Continue to participate in international activities with the IAEA, NEA and the FRG.

Alternative Disposal Concepts

- The subseabed activities, which were the Department's only effort to conduct research and development on alternative nuclear waste disposal concepts as provided by Section 222 of the NWPA, will be terminated after FY 1986. Accordingly, the following activities will be brought to a close during FY 1986:
- Seafloor topographic mapping of the two Atlantic site study areas.
- Deployment of the one-year in Situ Heat Transfer Experiment on the sea floor to determine sediment and pore water behavior during heating.
- The assessment of potential near-field sediment chemical reactions of reference waste and canister materials.
- The biological radiosensitivity assessment of deep ocean organisms as a basis for radiological tolerance.
- Development of a site specific ocean circulation model.
- Collection of long-core sediment samples from the two Atlantic study areas in order to characterize deep sediments.
- Preliminary tests on self-closure of holes in sediment following simulated emplacement of waste canisters.
- Participation in the NEA Seabed Working Group.

Expected FY 1987 accomplishments include:

Spent Fuel Storage Development

- continue dry storage cask testing at INEL in conjunction_with Virginia Power.
- Complete preliminary tests and analyze results from Carolina Power and Light's Nutech Horizontal Module System transport cask.
- Complete preliminary tests and analyze results from the Tennessee Valley Authority's GNS CASTOR 1C cask at Browns Ferry, if the TVA continues this activity under the Interagency Agreement.

- Begin consolidation demonstrations of spent fuel in a cooperative project with Northeast Utilities Services Company in their Millstone II reactor spent fuel pool.
- Issue updated topical report on "The Design Basis for Storage of Spent Fuel in Air."
- Publish annual Federal interim Storage Fee Schedule in Federal Register.
- Issue Federal Interim Storage Deployment Plan to Congress.
- Issue updated Spent Fuel Storage Requirements Report.
- Continue cooperative activities in information exchange spent fuel storage with the non-nuclear weapon states.
- Continue to participate in international activities with the IAEA, NEA and the FRG.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ENERGY SUPPLY RESEARCH AND DEVELOPMENT ACTIVITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

Civilian Radioactive Waste Research and Development (OCRWM)	FY 1985 Appropri- ation	FY 1986 Appropri- ation	FY 1987 Base	FY 1987 Request	Request vs Base
Spent Fuel Storage Development					
Operating expenses...........	$11,465	$ 7,496	$ 7,496	$ 6,300	$-1,196
Capital equipment............	1,000	1,058	1,058	---	-1,058
Subtotal.....................	12,465	8,554	8,554	6,300	-2,254
Alternative Disposal Concepts					
Operating expenses...........	9,830	5,292	5,292	---	-5,292
Capital equipment............	1,500	1,915	1,915	---	-1,915
Subtotal.....................	11,330	7,207	7,207	---	-7,207
Generic Methods and Supporting Studies					
Operating expense............	1,825	---	---	---	---
Subtotal.....................	1,825	---	---	---	---
Program Direction					
Operating expenses...........	266	303	303	200	103
Subtotal.....................	266	303	303	200	-103
Total					
Operating expense............	23,386	13,091	13,091	6,500	-6,591
Capital equipment............	2,500	2,973	2,973	---	-2,973
Grand Total..................	$25,886a/	$16,064b/	$16,064b/	$ 6,500	$-9,564
Staffing Total FTE.............	4	5	5	3	-2

Authorization: Sec. 31, P.L. 83-703 and P.L. 97-425.

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a/ Reflects General Reduction of $660,000; ADP Reduction of $550,000; and savings from management initiatives of $343,000 per Congressional Directive in Conference Report (H. Rept. 98-866) to P.L. 98-360, and $201,000 transferred to the Office of Energy Research (OER) for Small Business Innovation Research (SBIR) activities in FY 1985, in accordance with P.L. 97-219.

b/ Reflects a General Reduction of $30,000 and a reduction of $631,000 in compliance with the Gramm-Rudman-Hollings deficit reduction act, PL 99-177. Details of the reductions are provided on the attached table.

(2) Design - includes conceptual, preliminary and final design, inspection services, system(s) acceptance testing, and facility startup.

(3) Building and structures - includes modification and construction of facilities (e.g., Component Test Stand) for waste solidification and supporting systems/activities, field offices, and storage sheds.

(4) Special equipment - includes waste removal, transfer, solidification, and other systems necessary to carry out the waste immobilization and supernatant treatment program.

(5) Operating - includes labor and material costs, including steel canisters, for the waste processing operations.

Decontamination and Decommissioning

This category covers the planning, engineering, equipment, and operations necessary for project D&D. It provides for the initial decontamination to prepare contaminated areas and hot cells for reuse by the project.

Site Operations

This category includes site/facility operations, training, maintenance, restoration, and upgrades (e.g., electrical and water supply system, roads, roofs, etc.) necessary to support waste solidification, decommissioning, environmental and occupational safety, security and safeguards requirements.

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a/ Does not include post-solidification (e.g., waste storage and transportation and final decontamination and decommissioning) costs.

Direct Project Related Support

This category provides for technical, administrative, and overall management control of the project. Activities preformed support other project elements and include items such as cost/schedule control systems, project reports, quality assurance program, public communication program, and records management.

Low-Level and TRU Waste Handling

This category includes the Cement Solidification and Liquid Waste Treatment systems for low-level waste disposal; Size Reduction and TRU Decon Facility and TRU Interim Storage Facility for handling of TRU waste generated in the decontamination and decommissioning of the process building for reuse; and project radiological safety and control support activities.

Capital Equipment

This category provides equipment used in initial site takeover operations and restoration activities, such as health physics and environmental monitoring instrumentation and equipment, decontamination and decommissioning tools and equipment, manipulators and hot cell lights, and analytical chemical laboratory equipment.

General Plant Projects

This category provides for miscellaneous small construction and improvement projects, such as installation of a meteorological and environmental monitoring laboratory, construction of a low-level/transuranic waste sorting facility, construction of a facility to protect the component test stand, and upgrade of the low-level waste treatment facility and laundry.

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a/ Does not include post-solidification (e.g., waste storage and transportation and final decontamination and decommissioning) costs.

DEPARTMENT OF ENERGY

FY 1987 CONGRESSIONAL BUDGET REQUEST

Adjustments to FY 1986 Appropriations
(dollars in thousands)

Civilian Radioactive Waste Research and Development	FY 1986 Appropriation	Gramm-Rudman-Hollings	General Reduction	Management Initiatives	DOE Wide FTE Reduction	Pay Restoration	Subtotal	Comparability Adjustments	Total
Spent Fuel Storage Development									
Operating expenses...........	$ 7,800	-294	-10	---	---	---	---	---	$ 7,496
Capital equipment............	1,100	-42	---	---	---	---	---	---	1,058
79-1P-AFR FAC................	---	---	---	---	---	---	---	---	---
Subtotal.....................	8,900	-336	-10	---	---	---	---	---	8,554
Alternative Disposal Concepts									
Operating expenses...........	5,500	-208	---	---	---	---	---	---	5,292
Capital equipment............	2,000	- 75	-10	---	---	---	---	---	1,915
Subtotal.....................	7,500	-283	-10	---	---	---	---	---	7,207
Generic Methods and Supporting Studies									
Operating expense............	---	---	---	---	---	---	---	---	---
Subtotal.....................	---	---	---	---	---	---	---	---	---
Program Direction									
Operating expenses...........	325	-12	-4	---	-6	---	---	---	303
Subtotal, Civilian Waste R&D.	$16,725	$ -631	$ -24	$ ---	$ -6	$ ---	$ ---	$ ---	$16,064

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUEGET REQUEST
SUMMARY OF CHANGES
CIVILIAN RADIOACTIVE WASTE RESEARCH AND DEVELOPMENT
(In thousands of dollars)

FY 1986 Appropriation Enacted....................................	$16,064
Build in increases and decreases:	
Transfer to OER for SBIR activities............................	-72
FY 1987 Base...	$15,992
Program increases and decreases:	
Escalation increase..	+ 690
Spent Fuel Storage Development	
Provides for a coordinated implementation of cooperative projects and supporting R&D for NRC generic decision making process.....	- 2,555
Alternative Disposal Concepts	
Terminates the subseabed disposal subprogram...................	- 7,524
Program Direction	
Reduction resulting from reduction to FTES.....................	- 103
FY 1987 Budget Request	$ 6,500

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CIVILIAN RADIOACTIVE WASTE RESEARCH AND DEVELOPMENT
(Budget Authority in Thousands)

FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
$25,886	$16,064	$ 6,500

Civilian Radioactive Waste Research and Development

The Civilian Radioactive Waste R&D Program is comprised of generic research, cooperative agreement activities, Federal Interim Storage planning and information exchange with NNWS consistent with the Nuclear Waste Policy Act (NWPA). Some of these activities were in progress prior to passage of the Act and others were new initiatives. All of these activities have now been integrated to avoid duplication and to carry out the requirements of the NWPA and other related waste management initiatives.

The R&D activities will be conducted for the purpose of providing or supplementing the technical data base for safe storage and transport of spent fuel; for utility licensing activities; for rulemakings; and for Federal Interim Storage.

Title II of the NWPA P.L. 97-425, pertains to the research, development, and demonstration activities relevant to the disposal of high-level radioactive waste and spent nuclear fuel. With respect to the Civilian Radioactive Waste R&D program, the purpose of this title is --

(1) to provide technology input to the Secretary of Energy relevant to the disposal of high-level radioactive waste and spent nuclear fuel, and

(2) to authorize the Secretary of Energy to provide for a focused and integrated high-level radioactive waste and spent nuclear fuel research and development program, including:

  (a) the development of licensing data through cooperative demonstrations of dry storage of spent nuclear fuel and rod consolidation (Section 218);

  (b) A program of research, development, and investigation of alternative means and technologies for the permanent disposal of high-level radioactive waste from civilian nuclear activities and Federal research and development activities (Section 222); and

  (c) A program for cooperation and technical assistance with NNWS in the fields of spent fuel storage and disposal (Section 223).

The Secretary is required to fund these activities from the Energy Supply Research and Development Appropriation rather than from revenues collected from utilites and deposited in either the Nuclear Waste Fund or the Interim Storage Fund. To accommodate the funding of these generic and alternative activities, the DOE has created a decision unit entitled Civilian Radioactive Waste Research and Development Program comprised of four subprograms: Spent Fuel Storage Development; Alternative Disposal Concepts;

Generic Methods and Supporting Studies; and Program Direction. No funds are being requested in FY 1987, however, for the Alternative Disposal Concepts Subprogram and the Generic Methods and Supporting Studies Subprogram. Accordingly, activities to implement Section 222 of the NWPA will not be pursued.

The Federal Interim Storage program is contingent upon utility need. The NRC establishes the eligibility criteria for this service under 10 CFR Parts 1 and 53. Currently, there is no expressed utility need for this service, and therefore, DOE is funding only planning activities relevant to Federal Interim Storage. These planning activities are included in the Spent Fuel Storage Reseach subprogram. However, funding of these activities will be transferred to the Interim Storage Fund upon its activation. The Civilian Radioactive Waste Research and Development program is managed by the Director, Office of Civilian Radioactive Waste Management who reports directly to the Secretary as mandated by Section 304(b) of the Act.

There are several varied objectives associated with the Civilian Radioactive Waste R&D Spent Fuel Storage Development Subprogram. It provides assistance to utilities for spent nuclear fuel storage development including the development of data and demonstrations to support dry storage of spent nuclear fuel and rod consolidation. It provides technical assistance to NNWS in the fields of spent nuclear fuel storage and disposal and it plans for Federal Interim Storage, if needed.

The FY 1987 Request is $6,500,000 which is $9,564,000 less than the amount appropriated in FY 1986, and the narrative justification that follows is focused on this level of funding.

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
A. Spent Fuel Storage Development - Total..........	$12,465	$ 8,554	$ 6,300
Operating expenses - Only....	$11,465	$ 7,496	$ 6,300

Implementation Strategy

The objectives of the Department's Spent Fuel Storage Development Subprogram are to encourage and expedite the most efficient use of existing storage facilities and the addition of new storage capacity in a timely fashion. The primary means for accomplishing this under the NWPA are:

(1) To establish, in cooperation with the private sector, a demonstration program for the dry storage of spent nuclear fuel at civilian nuclear power reactor sites with the objective of establishing one or more technologies that the Nuclear Regulatory Commission (NRC) may, by rule, approve for use by the industry, [Section 218(a)].

(2) To undertake a cooperative program with the private sector to encourage the development of spent fuel rod consolidation technologies in existing power reactor water storage basins, [Section 218(a)].

(3) To provide consultative and technical assistance on a cost sharing basis to the private sector for the design support and generic licensing documentation required by the Nuclear Regulatory Agency (NRA) to permit construction authorization and licensing for onsite dry storage technologies, [Section 218(a)].

(4) To establish a cost shared development program at Federal facilities for not more than 300MT of spent fuel to collect necessary data to assist the utilities involved in the licensing process, [Section 218(c)(1)].

(5) To provide generic research and development of alternative spent nuclear fuel storage technologies to enhance utility provided, at-reactor storage capabilities, [Section 218(b)(3)].

(6) To cooperate with non-nuclear weapon states by providing technical assistance in the field of spent fuel storage and disposal, [Section 223].

(7) To provide a full cost recovery program for the Federal Interim Storage (FIS) of not more than 1900 metric tons of storage capacity if requested by an owner or operator of a power reactor and upon a determination by the NRC that despite diligent pursuit of licensed alternatives, adequate storage capacity cannot be found and the continued orderly operation of the reactor plant is threatened, [Section 135 and 136].

Plans for further development of rod consolidation and dry storage through these means are summarized below.

(a) Spent Nuclear Fuel Rod Consolidation

Rod consolidation involves the dismantling of the fuel assembly and rearranging the spent fuel rods into a more compact array. It represents a cost-effective method for significantly increasing the capacity of storage pools that have sufficient structural strength to safely support the added weight and for reducing the number of shipments to disposal or storage facilities.

The Department began its research on rod consolidation in FY 1980 when it contracted for the design and fabrication of Pressurized Water Reactor rod consolidation equipment. In FY 1981, the Department successfully completed a cold demonstration of this equipment using a dummy assembly. This equipment was then modified to handle Boiling Water Reactor (BWR) spent fuel for use in a cooperative demonstration program with the TVA. This demonstration is to be completed in FY 1986, and involves the disassembly and consolidation of 12 BWR assemblies located in the Browns Ferry storage pool. A final report of this demonstration will be issued in FY 1987.

In May 1983, the Department issued a solicitation for cooperative agreement proposals for licensed in-basin rod consolidation. One proposal was received and negotiations are underway. Completion of negotiations and finalization of an agreement are expected in FY 1986. Activities will be initiated in FY 1986 and the actual schedule will depend on the negotiated scope of work. This new agreement will supplement the unlicensed BWR rod consolidation demonstration with the TVA and meet the objective of a licensed demonstration of an in-pool consolidated spent fuel storage in a time frame consistent with industry needs. An objective of this

In the first quarter of FY 86 an opportunity for an early demonstration of in-pool rod consolidation became available at the West Valley storage pool with fuel owned by Rochester Gas and Electric Company (RG&E) and consolidation equipment fabricated by the Nuclear Assurance Cooperation. This project is in process and expected to be completed by the end of FY 86. The consolidated fuel will be shipped back to the RG&E - Ginna facility for storage.

It is expected that, where physically possible, significant quantities of spent fuel will be consolidated and that this could result in a substantial increase in storage capacity at some reactor sites.

(b) Dry Storage

Dry storage systems provide an alternative for additional spent fuel storage at nuclear powerplants that cannot accommodate reracking or rod consolidation because of the economic, seismic, or structural limitations of their spent fuel storage pools. A variety of dry storage systems under consideration include casks, drywells, silos, and vaults; these systems are passive, modular, and cost-effective because they are easily maintained. The modular aspect offers the economic advantage of adding storage in small increments, thereby avoiding large initial capital outlays.

The Department has been actively supporting dry storage technologies. Drywell, silo, and vault storage have been demonstrated at the Department's facilities in Nevada. Dry storage of light water reactor spent fuel, however, has never been licensed in the United States. To address this, the Department entered into a interagency agreement with the TVA in 1982 to demonstrate the licensed storage of BWR spent fuel in two prototype dry storage casks. These casks were the REA-2023 and the CASTOR 1C. The REA cask was designed to store 52 BWR fuel assemblies and the CASTOR cask was designed to store 16 BWR fuel assemblies. The REA cask is owned by the Department and is now being considered for an alternate activity at a Federal Site due to its unlicensed status. A license application was submitted by TVA to NRC in FY 1984 for the CASTOR 1C cask. The cask will be loaded with fuel following NRC approval of the license application, which could be in FY 1986 or FY 1987. Fuel will be stored about 2 years at which time the fuel will be returned to the storage pool.

In addition, a solicitation for cooperative agreement proposals for dry storage demonstrations was issued in May 1983. Proposals were received and cooperative agreements negotiated with Virginia Power and the Carolina Power and Light Company. These agreements were signed in March 1984. The Virginia Power agreement provides for the licensed testing of spent fuel in five casks at the Surry Power Station. In addition, Surry fuel will be shipped to INEL for an unlicensed test in the four casks supplied by Virginia Power. The Federal site tests will demonstrate dry storage using different cover gases, including air, and may involve consolidation of some fuel. The program will be able to upgrade the Idaho Test Area North (ID-TAN) facility this year and receive the 4th shipping/storage cask under the cost-shared DOE/Virginia Power cooperative agreement. Also, the program would proceed with activities necessary for establishing the technical bases for NRC to license dry storage by generic rule. The Carolina Power and Light agreement provides for licensed testing of dry storage at the H.B. Robinson Plant Site utilizing horizontal, modular concrete silos. The fuel will be sealed in inerted canisters. These dry storage demonstrations will expand the technical data base available for

Carolina Power and Light agreement provides for licensed testing of dry storage at the H.B. Robinson Plant Site utilizing horizontal, modular concrete silos. The fuel will be sealed in inerted canisters. These dry storage demonstrations will expand the technical data base available for license applications of dry storage concepts, and will supplement data from other demonstrations such as the one being conducted with TVA.

The technical data for the 10 CFR 72 licensing provision at specific reactor sites, cask performance characteristics and cost-effectiveness of dry storage technology will be obtained from these demonstrations.

(c) Federal Interim Storage

The increased efficiency of onsite spent fuel storage that is expected to result from successful completion of the fuel rod consolidation and dry storage demonstrations discussed in the previous section should be sufficient to preclude the need for Federal Interim Storage. However, in compliance with the NWPA of 1982 and as a prudent backup in case unexpected problems arise during the rod consolidation and dry storage demonstrations, DOE has developed a deployment plan, as required by the Act, to provide Federal Interim Storage if any utility requests it and the NRC determines that the utility is eligible under 10 CFR 53. Federal Interim Storage planning will meet the legislated requirements for annual revision of Federal Interim Storage fee schedule and deployment plans considering changes that have occurred since FY 1986. DOE's ability to respond to requests for Federal Interim Storage in the time frame required will be enhanced by this updated planning.

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Capital equipment - Only...........	$1,000	$1,058	---

No funds are being requested for FY 1987.

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
B. Program Direction..............	$ 266	$ 303	$ 200

At the Departmental Request, three (3) full-time equivalents and $200,000 are required to maintain management oversight of the Civilian Waste Research and Development programs in FY 1987. The personnel required include administrative and technical talent who manage a broad range of activities, including research, development, demonstration, industrial involvement, and international programs.

Headquarters staff are responsible for establishment of broad objectives, scopes of work, general program resource levels, and broad technical management interfaces necessary for program direction. Specific functions include assessment of technical progress project planning, milestone progress, cost expenditures, guidance, overview and integration of all contractor activities, and initiation of appropriate actions to resolve problems in any of these areas.

Also, Headquarters personnel handle active interfaces with other Executive Branch agencies such as the Department of State and, the Nuclear Regulatory Commission, and respond to numerous public and Congressional inquiries. Other interfaces are maintained with the nuclear industrial community and contractors, including the Electric Power Research Institute, the utility industry, major suppliers, and the National Laboratories.

A detailed breakout of the Program Direction request follows:

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Personnel Compensation.............	$ 230	$ 256	$ 168
Personnel Benefits.................	27	28	20
Travel and Transportation of Persons........................	9	19	12
Total.............................	$ 266	$ 303	$ 200

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Nuclear Waste Disposal Fund

For nuclear waste disposal activities to carry out the purposes of Public Law 97-425, including the acquisition of real property or facility contruction or expansion, [$521,460,000] $769,349,000, to remain available until expended, to be derived from the Nuclear Waste Fund. To the extent that balances in the fund are not sufficient to cover amounts available for obligation in the account, the Secretary shall exercise his authority pursuant to section 302(e)(5) to issue obligations to the Secretary of the Treasury. (Public Law 99-141, making appropriations for energy and water development, 1986.)

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

NUCLEAR WASTE FUND

(Budget Authority in Thousands of Dollars)

	FY 1985 Actual	FY 1986 Estimate	FY 1987 Request
Nuclear Waste Fund	$ 327,669	$ 499,037	$ 769,349
Revenues	$-1,721,011	$-498,900	$-538,000

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Nuclear Waste Fund

This overview document describes the Nuclear Waste Fund program within the Department of Energy. The Nuclear Waste Fund Program includes activities in the following major areas: geologic repositories, monitored retrievable storage (MRS), transportation and systems integration, program management and technical support.

Pursuant to Section 8 of the Nuclear Waste Policy Act of 1982 (NWPA) the President, on April 30, 1985, concluded that a defense only repository is not required. The President directed the Department to proceed with plans for collocation of commercial high-level radioactive waste and high-level radioactive waste resulting from energy defense activities.

The FY 1987 budget represents the third budget formulated by the Office of Civilian Radioactive Waste Management since the passage of the Nuclear Waste Policy Act (NWPA) of 1982. This budget presents an integrated picture of all programmatic activities listed above.

Objectives and strategies are discussed below:

Program Objectives

1. To site, design, license, construct, operate and decommission geologic repositories for the safe, environmentally acceptable disposal of radioactive waste, including high-level radioactive waste resulting from atomic energy defense activities.

2. To complete a detailed study of the need for and feasibility of, and submit to Congress a proposal for, the construction of one or more MRS facilities.

3. To ensure acceptance of waste for disposal by January 31, 1998, in accordance with the annual capacity report as stipulated in the Department's disposal contracts with the nuclear utilities and in conformance with the NWPA of 1982.

4. To ensure fiduciary responsibility in the execution and management of technically sound, cost-effective programs.

5. To develop and operate a safe, efficient system to transport spent fuel and high-level waste from the sources at the reactors to a repository.

The Department plans to carry out this program with full adherence to the legislated institutional process while developing sound technical data needed to support key milestones and decision points.

Program Strategy

As an early step in carrying out the Department's plan for the development and operation of geologic repositories for the permanent disposal of spent nuclear fuel and high-level radioactive waste, the Department has executed contracts with the owners and generators of civilian nuclear wastes. These contracts specify the terms under which the Department will accept the wastes via the annual capacity report which will project the annual receiving capacity for DOE facilities. Currently, the acceptance rate is based on the emplacement capacity projected for two planned geologic repositories which will be operated and maintained by the Department, although construction of the second repository is contingent upon future Congressional authorization.

This Nuclear Waste Fund budget prices out the work efforts for the programs for FY 1987 and provides an estimate of FY 1988 and FY 1989 requirements. For the repository activity, the site characterization phase of the program is dominant in this time frame. Site characterization activities include obtaining the technical information necessary to support a licensing application through field exploration from each of the sites. This activity will include the sinking of exploratory shafts to the depth of the proposed disposal locations, extensive surface and subsurface investigations, and other development and evaluation techniques required to obtain the data needed to support a license application to NRC. In this process, the Department will satisfy the Federal/State agreements that are in effect relating to the site of a repository. Funds are also being requested in this submittal for FY 1987 thru FY 1989 to support the activities separately proposed to Congress in the MRS proposal.

Approved and Improved System Costs

Each year the Department analyzes the total system costs for a series of cases that reflect, as closely as possible, current program strategy for meeting legislative milestones and the most recent design studies. The January 1986 Total Systems Life Cycle Cost Analysis (TSLCC) estimates the costs for two alternative waste acceptance configurations; the approved system (AS) which is based on current strategy, and the improved performance system (IPS) configuration which is based on the integration of a Monitored Retrievable Storage Facility (MRS) into the system. A proposal to adopt this latter concept will be submitted to the Congress in early 1986. Preliminary 1986 cost estimates for ten reference cases of the AS system, where each reference case represents a different pair of geological media currently being considered for repository location, range from $24 billion to $32 billion. The coresponding preliminary estimates for the reference cases of the IPS system range from $26 billion to $34 billion.

The TSLCC analysis divides the AS system costs into 3 major categories. These are: development and evaluation costs, repository construction and operation costs, and spent fuel transportation costs. The IPS total systems costs adds a forth category which addresses the MRS facility. The MRS facility costs are projected to be approximately $2.8 billion. However, the incremental difference between AS and IPS system costs for identical reference cases is only approximately $2 billion. Total cost differences between the AS and IPS systems are less than the explicit MRS facility costs because some of the functions previously performed at the repositories have been transferred to the MRS.

Nuclear Waste Policy

The NWPA was enacted by Congress in December 1982 and signed into law by President Reagan on January 7, 1983. As stated earlier, the NWPA establishes a comprehensive national policy on high-level waste; it establishes:

1. Specific and comprehensive goals and objectives which are . . .

    - to site, design, license, construct, and operate geologic repositories for permanent disposal,
    - to contract with utilities for accepting their waste, and
    - to develop a proposal for construction of one or more MRS facilities for temporary waste storage;

2. Credible institutional mechanisms, including . . .

    - approval of a mission plan,
    - assured funding through a utility fee based on net generation of electricity, and
    - creation of a waste management organization in DOE reporting to the Secretary; and

3. Measures to address public concerns, including . . .

    - sound, credible technical programs to address and resolve technical issues concerning permanent geologic disposal,
    - provision and funding for public participation,
    - a regulatory process suitable for a first-of-a-kind undertaking,
    - state/tribal participation in siting decisions, with rights to submit a notice of disapproval to the Congress over the selection of a site within State or tribal lands,
    - entitlement to compensation for negative impacts resulting from a waste disposal project.

Repository Program

The NWPA mandates a comprehensive set of Federal activities designed to have the Nation's first permanent nuclear repository in operation by 1998.

Interwoven throughout the program is a fabric of checks and balances that ensure Federal accountability to the States, to the public, to the utilities and rate payers, and to affected Indian Tribes--as well as to the Congress. These institutional requirements set forth a framework for developing one or more permanent repositories and to ensure that a safe, efficient and timely waste management system is developed and implemented. It is incumbent on DOE, therefore, to perform a technically sound job of site selection, repository and MRS construction, transportation and disposal of spent fuel and/or high-level waste.

Further, DOE intends to conduct an open and accountable decision-making process throughout the life of the program. This process includes pursuing thoughtful working relationships among individuals and institutions. The cornerstone of such an approach must be communication, that is, consistent and timely sharing of information and perspective. These major principles define DOE's long-term approach; short-term decisions will not be allowed to undercut this strategy.

In the FY 1986 program for the first repository, DOE will nominate five and recommend three sites for site characterization for the President's final decision. DOE's nomination and recommendation of sites will be based on the siting guidelines (10 CFR 960), utilizing available geotechnical, environmental and other relevant information. After the recommendation is final, DOE will begin an intensive site evaluation program including in situ testing at the bottom of deep exploratory shafts. Shaft construction at the three sites will take approximately 2 years with in situ tests scheduled to start in FY 1989. Currently, DOE is planning two shafts at each site. After site characterization has been completed, DOE will recommend one site to the President for the Nation's first repository site. Once approved, DOE will submit its license application to the Nuclear Regulatory Commission (NRC).

The NWPA also directs DOE to conduct site investigations for a second repository, although construction of the second repository is contingent upon future Congressional authorization. The process for selecting the second repository site is the same winnowing process as described above for the first repository with decision points spaced about 7 years after those for the first repository. The DOE may consider sites identified as potentially acceptable but not nominated for the first repository, sites found potentially acceptable from rock formations not previously studied in the first repository selection process and sites characterized but not chosen for the first repository site. The final Area Recommendation Report identifying the crystalline rock areas to be investigated further will be issued in FY 1987.

Monitored Retrievable Storage

The NWPA directs the DOE to complete a study of the need for and feasibility of an MRS, and submit to the Congress a proposal for the construction of one or more MRS facilities. The NWPA specifies that the proposal include a program for siting, development, construction and operation of an MRS facility; site specific designs and cost estimates for the construction of the first facility; a plan for funding the construction and operation of such facilities; and a plan for integrating such facilities into the Federal waste management system. The proposal will be submitted to Congress in February 1986. Funds are being requested in this submittal for FY 1987 thru FY 1989 to support the activities in the proposal.

Transportation and Systems Integration

The systems integration activities focus on integrating, coordinating, and optimizing the total waste management system in a cost-effective manner.

The transportation objective is to assure that a safe, environmentally acceptable, and cost-effective transportation system is in place by 1996. This system must utilize the private sector to the fullest extent possible. Activities will continue in FY 1987 to support private sector design and development of cost-effective transportation equipment and components needed to safely transport commercial spent fuel from the civilian reactors to the repository or MRS.

Legislated Milestones

Listed below are important milestones which are required by the Act and revisions presented in the Mission Plan.

- By July 7, 1983, DOE is to issue general guidelines for the "recommendation of sites for repositories." Congress was previously notified that this milestone was not achieved. These guidelines were approved by NRC in June 1984 and were published in the Federal Register in December 1984.

- By January 7, 1984, DOE is to submit to the Congress a location report on a Test and Evaluation Facility (TEF). DOE has decided that, if needed, a TEF would be collocated at a potential repository site and has notified Congress (in April 1984) that the decision on whether or not to propose a TEF would be made in FY 1987.

- By April 7, 1984, DOE is to submit a comprehensive Mission Plan which shall provide an information base sufficient to permit informed decisions to be made in carrying out the repository and R&D programs contained in the Act. The final Mission Plan was issued and submitted to Congress in July 1985.

- o By January 1, 1985, DOE is to complete nomination of at least five sites and recommend three repository sites to the President for site characterization. This milestone has been rescheduled to 1986.

- o By June 1, 1985, DOE is to submit to the Congress a proposal for the construction of one or more MRS facilities. On May 31, 1985, Congress was provided with a status report that informed the appropriate Committees of the progress made to date in preparation of the proposal, and described the plans and schedules for its completion. The proposal package is currently scheduled to be submitted to the Congress in February 1986.

- o By March 31, 1987, following the completion of site characterization, the President is to submit to the Congress his final selection of the site for the first repository. (This deadline may be extended to 12 months, and the Governor, legislature, or Indian tribe--if the site is on a reservation--may disapprove the siting decision, subject to override by Congressional Joint Resolution.) This is now scheduled for 1991.

- o By January 1, 1989, or within 3 years of DOE application (whichever is later), the NRC is to decide whether to permit construction of the first repository. This milestone can be extended for up to 1 year. Current schedule for this is 1993.

- o By July 1, 1989, DOE is to nominate five sites (including at least three not previously nominated) for a second repository and recommend three of these to the President. This is now scheduled for 1993.

- o By March 31, 1990, the President is to submit to the Congress the final selection of the site for the second repository. This milestone can be extended for up to 1 year. Current schedule for this is 1999.

- o By January 1, 1992, or within 3 years of DOE application (whichever is later), the NRC is to decide whether to permit construction of the second repository. This milestone can be extended up to 1 year. This is scheduled for 2002.

- o By January 31, 1998, DOE is to begin accepting spent fuel and high-level waste for disposal in the first repository.

Program Highlights

Throughout the program there are numerous additional milestones and objectives, many of which relate to the rights of governors, legislatures, and any affected Indian Tribes, together with associated DOE responsibilities. Some of the near-term major accomplishments and planned activities of the Nuclear Waste Fund program are summarized below:

FY 1985 accomplishments include:

- o Published Mission Plan.
- o Issued siting guidelines.
- o Published 3rd Fee Adequacy Report.
- o Issued draft Project Decision Schedule.
- o Issued draft Environmental Assessments.
- o Held public hearings on draft Environmental Assessments.

- Issued regional to area screening methodology for crystalline rock program.
- Issued final Regional Characterization Reports for the crystalline rock program.
- Received payments totaling $1,427,428,803 -- more than half of the one-time fee liability for civilian nuclear waste in existence as of April 6, 1983.
- Published Second Annual Report to Congress.
- Initiated studies of preliminary concepts and techniques for integrating the overall waste management plan.
- Initiated independent financial audit of Nuclear Waste Fund for FY 1985.
- Submitted report to Congress on alternative means of financing and managing radioactive waste facilities.
- Identified candidate sites and completed facility designs for the MRS.
- Issued the Draft Transportation Business Plan for public comment
- Developed Draft Transportation Institutional Plan for public comment.
- Completed an independent financial audit of the Nuclear Waste Fund for FY 1983 and FY 1984.
- Reimbursed U. S. Treasury $264,964,663 the total amount owed on the appropriated debt transferred to the NWF upon enactment of the NWPA in FY 1983.

Expected FY 1986 accomplishments include:

- Issue final Environmental Assessments for first repository.
- Recommend three candidate first repository sites to the President for site characterization.
- Initiate advanced conceptual designs for the waste package and repository at the three selected candidate sites.
- Issue draft Area Recommendation Report for crystalline rock investigations.
- Finalize agreement with DOE defense programs on fee payments for defense waste disposal.
- Stimulate private sector efforts to design and certify advanced transportation casks.
- Complete independent financial audit of Nuclear Waste Fund for FY 1985.
- Begin incorporating changes into the storage, transportation and repository design activities as a result of system integration studies initiated in FY 1985.
- Submit a proposal to Congress for the construction of one or more MRS facilities.
- Initiate independent financial audit of the Nuclear Waste Fund for FY 1986.

- Publish Third Annual Report to Congress.
- Publish Fourth Fee Adequacy Report.
- Issue the Project Decision Schedule.

Expected FY 1987 accomplishments include:

- Issue Site Characterization Plans for three candidate first repository sites.
- Start construction of exploratory shafts in basalt and tuff, if selected.
- Issue final Area Recommendation Report for crystalline rock investigations.
- Issue draft Area Characterization Plan for crystalline rock investigations.
- Initiate development of a generic repository conceptual design in crystalline rock.
- Publish Fourth Annual Report to Congress.
- Publish 5th Fee Adequacy Report.
- Complete independent financial audit of Nuclear Waste Fund for FY 1986.
- Initiate independent financial audit of Nuclear Waste Fund for FY 1987.
- Continue engineering development, fabrication and testing of prototypes of "new generation" casks for truck, rail and barge transport.
- Complete evaluation of waste characteristics, packaging and handling capabilities at individual reactors.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
NUCLEAR WASTE FUND
(Tabular dollars in thousands. Narrative material in whole dollars.)

Nuclear Waste Fund	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base	FY 1988 Estimate	FY 1989 Estimate
First Repository							
Operating expenses....	$227,336	$373,350	$373,350	$524,000	+$150,650	$558,600	$470,800
Capital purchase......	7,910	12,700	12,700	17,800	+5,100	5,100	3,600
Construction..........	---	---	---	---	---	68,700	97,100
Total.................	235,246(a)	386,050	386,050	541,800	+155,750	632,400	571,500
Second Repository							
Operating expenses....	24,609	34,600	34,600	72,500	+37,900	69,800	67,900
Capital purchase......	100	900	900	6,200	+5,300	4,400	3,600
Construction..........	---	---	---	---	---	---	---
Total.................	24,709	35,500	35,500	78,700	+43,200	74,200	71,500
Monitored Retrievable Storage (MRS)							
Operating expenses....	17,469	3,000	3,000	38,800	+35,800	27,400	23,200
Capital purchase......	---	---	---	---	---	---	---
Construction..........	---	---	---	7,200	+7,200	22,600	29,800
Total.................	17,469(a)	3,000	3,000	46,000	+43,000	50,000	53,000
Transportation and Systems Integration							
Operating expenses....	2,875	21,275	21,275	32,875	+11,600	32,800	27,050
Capital purchase......	---	---	---	500	+ 500	1,000	4,000
Construction..........	---	---	---	---	---	---	---
Total.................	2,875	21,275	21,275	33,375	+12,100	33,800	31,050
Program Management and Technical Support							
Operating expenses....	43,305	52,712	53,260	68,595	+15,335	71,622	71,650
Capital purchase......	765	500	500	879	+ 379	1,042	542
Construction..........	---	---	---	---	---	---	---
Total.................	44,070(a)	53,212	53,760	69,474	+15,714	72,664	72,192
Debt Service (Interest)	3,300	---	---	---	---	---	---
Total							
Operating expenses....	318,894	484,937	485,485	736,770	+251,285	760,222	660,600
Capital purchase......	8,775	14,100	14,100	25,379	+11,279	11,542	11,742
Construction..........	---	---	---	7,200	+7,200	91,300	126,900
Nuclear Waste Fund................	$327,669	$499,037(b)	$499,585(b)	$769,349	$+269,764	$863,064	$799,242

Authorization: Sec. 31, P.L. 83-703, P.L. 97-425

(a) During FY 1985, $8,994,000 was reprogrammed from the First Repository and Program Management and Technical Support to the Monitored Retrievable Storage Program.

(b) Reflects reduction of $22,423,000 in compliance with the Gramm-Rudman-Hollings deficit reduction act, P.L. 99-177. Details of the reductions are provided in the attached table.

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base	FY 1988 Estimate	FY 1989 Estimate
Staffing Total FTE.	238	292	292	292	---	292	292

Projected Receipts by Fiscal Year
(dollars in thousands)

Description	1985[1]	1986	1987	1988	1989
One mil/KWh fee...........	$ 367,327	$378,600(2)	$420,500(2)	$474,500(2)	$508,600(2)
One-time fee..............	1,427,429	2,300	2,500	17,200	17,500
Total..................	$1,794,756	$380,900	$423,000	491,700	$526,100
Interest Earned	$ 38,455	$118,000(3)	$115,000(3)	$105,000(3)	$ 99,000(3)

(1) 1985 reflects actual cash collected.

(2) Based on projected gross nuclear electricity generation reduced by 5% to approximate net nuclear electricity generation as a result of the recent Wisconsin court decision. (Wisconsin Electric Power Company, et al vs Hodel, 83-1066,84-8571 (decided December 6, 1985)). At the time of this budget submission, net nuclear electricity generation projections are expected by the end of January.

(3) Based on average yield of Treasury security portfolio.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
NUCLEAR WASTE FUND
(dollars in thousands)

FY 1986 Appropriation Enacted	$499,037
Built-in increases and decreases: Federal Telecommunications Systems, commercial telephone, Standard Level User Charges	+548
FY 1987 base	$499,585

Program increases and decreases:

First Repository	+155,750

- The increased funding will provide for continuation of intensive site characterization activities that were initiated in FY 1986. At the three sites, increased borehole drilling and geologic analyses will provide surface and subsurface based data to help determine site suitability as well as provide information needed to assist in developing waste package and repository designs. Construction of exploratory shafts will begin at the tuff and basalt sites. In addition, the increase will also provide for the accelerated repository design and equipment development, licensing, and quality assurance activities.

Second Repository	+43,200

- The increase will support the preparation for area phase field studies, the expansion in the domestic and international cooperative programs, grants to affected States and Indian Tribes, and engineering activities related to waste package and repository design.

Monitored Retrievable Storage	+43,000

- The increase will support the activities in the MRS proposal that will be submitted to Congress in February 1986.

Transportation and Systems Integration	+12,100

- Transportation cask development contracts will be executed which will increase the transportation institutional outreach activities. An increase in economic and environmental analysis is required to provide route specific EIS information. Continue development of technology and data systems. Increase program management requirements (+$9,250).

- Under Systems Integration, increases are required primarily for prototype development and testing in the area of waste handling and packaging. Accelerated waste management systems integration activities are supported to assure that the various parts of that system are integrated into an efficient and cost-effective system (+$2,850).

SUMMARY OF CHANGES
NUCLEAR WASTE FUND
(Continued)

Program Management and Technical Support...................................	+15,714

- Technical support increases are primarily for contract support to continue integration and coordination activities, defense waste studies, outreach, financial assistance, waste package design, siting analysis/assessment, performance modeling/assessment, and initiate development of The Environmental Impact Statement and environmental analysis studies (+$15,593).

- Program management increase is due primarily to other administrative support costs above the base (+$121).

FY 1987 Congressional Budget..	$769,349

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NUCLEAR WASTE FUND
(Budget Authority in Thousands)

	FY 1986 Appropriation	FY 1987 Request	FY 1988 Estimate	FY 1989 Estimate
Nuclear Waste Fund - Grand Total	$521,460	$769,349	$863,064	$799,242

The goal of the Nuclear Waste Fund program is to permanently isolate defense and civilian high-level radioactive waste and spent fuel by placing them in a geologic repository. To this goal, the Department is relying primarily on deployment of one or more permanent repositories and possibly storage facilities such as the Monitored Retrievable Storage.

The objective of the Geologic Repositories Program is to site, design, license, construct, and operate and decommission one or more permanent repositories. The program's schedule is directed towards operating the first repository in 1998 by following the institutional process established by Congress in the Nuclear Waste Policy Act of 1982 (NWPA). This process includes State, Indian Tribe, and public involvement in site characterization activities leading to DOE site recommendation, Presidential site recommendation, and acceptance of the recommendation by the affected state, by any affected Indian Tribe(s), and by Congress. If the program needs additional research on repository operational activities, equipment development and demonstration or waste handling and emplacement processes, Congress has authorized the construction of a Test and Evaluation Facility as part of the repository program.

The Department will prepare and submit a proposal to Congress in February, 1986, for the construction of a Monitored Retrievable Storage facility. MRS program funding for 1987 thru 1989 contained in this budget supports that proposal.

The Transportation and System Integration activities are critical components of the overall waste management program. The transportation objective is to assure that a safe, environmentally acceptable, and cost-effective transportation system is in place by 1996. This system will utilize the private sector to the fullest extent possible. System integration activities will focus on integrating, coordinating, and optimizing the total waste management system and all of its components, including evaluation of alternative concepts, in a cost-effective manner.

The Office of Civilian Radioactive Waste Management (OCRWM), which was specifically authorized by Congress, manages these programs and is responsible for coordinating other activities that support these efforts. The salaries of the Federal personnel who manage these major programs and the support activities are also part of the Fund's budget request. They are included because Congress directed the Department to carry out these program activities on a full cost recovery basis.

This document provides a background on the Fund's revenue sources, defines the repository activities, and then separately describes the budget request for the major programs and their supporting activities. As mandated by the Act, the Fund's budget request is specifically submitted to support the FY 1987 appropriations. However, Congress also directed that the Department submit a triennial budget for authorization purposes. Therefore, the budget request is presented for each fiscal year, that is, FY 1987, FY 1988 and FY 1989.

Revenue Sources

To finance these programs, the NWPA established the Nuclear Waste Fund in the Treasury of the United States. The Fund receives all of the revenue the Department collects from generators of civilian high-level nuclear waste. In addition, the Fund receives revenues from the Department of Energy for the disposal of nuclear wastes from the Department's defense programs. Through the appropriation process, Congress makes funds available to the Department to carry out programs. Obligations incurred under this authority are liquidated from cash balances in the Fund. To the extent balances in the Fund are insufficient to cover maturing obligations, DOE can borrow cash from Treasury. Conversely, any excess cash balances over program requirements may be invested in Treasury obligations.

Currently, the main sources of revenue for the Fund are the fees Congress imposed on electricity generated by civilian nuclear power reactors. High-level radioactive waste and spent fuel generated prior to April 7, 1983 is subject to a one-time fee that is equivalent to one mill/kWh. Civilian nuclear power generation after April 6, 1983 is subject to an ongoing fee of one mill/kWh. As of the end of June, 1985 the total liability for one-time fees was approximately $2,300,000,000. At that time, a total of 32 entities consisting of public utilities, companies and the DOE nuclear energy program made one-time fee payments totaling $1,425,923,598. DOE paid $5,293,018 in one-time fees for non-defense waste, which is included in this total. The remaining 14 civilian nuclear power companies elected to make a series of time payments that begin at a later date. Three (3) power companies chose the "40 quarter option" (FY 1985 payments $1,508,779) and eleven (11) chose to pay under the "one-lump sum plus interest prior to the first delivery of spent fuel" option. All one-time fee payments made after June 30, 1985 are subject to and will include accrued interest from April 7, 1983.

The NWPA required the Department to evaluate the use of disposal capacity at one or more repositories for the disposal of high-level radioactive waste resulting from atomic energy defense activities. The Department recommended, and the President agreed on April 30, 1985, to dispose of defense waste in a civilian repository. The Federal Government will pay a fee equivalent to that paid by the public utilities for disposal of the waste in the repository. This use of the repository will generate additional revenues for the Fund. The precise amounts of these fees have not been finally determined and, therefore, are not included in these revenue estimates.

Repository Activities

A general description follows for activities conducted within the geologic repositories program. The activities are commonly described in terms of a program work breakdown structure or WBS: systems, waste package, siting, repository development, exploratory shaft development and in situ testing, regulatory and institutional activities, test facilities, land acquisition, and project management.

Work in systems involves the development, verification, and application of performance assessment models to describe overall repository performance. These studies will demonstrate compliance with Nuclear Regulatory Commission (NRC) regulations for geologic disposal of nuclear wastes (10 CFR 60) and Environmental Protection Agency (EPA) standards for allowable releases to the accessible environment (40 CFR 191). Also included in systems is the management integration and optimization of data collected from the site, repository, and waste package subsystems.

Waste package activities are directed at developing a component of a multi-barrier engineered system, which will contribute to the technical conservatism inherent in the natural geohydrologic system. Designs of waste packages must be tailored to be compatible with the expected repository conditions in the potential host rocks to meet regulatory requirements for long-lived waste packages (300-1,000 years) and must be cost-effective. Important activities in this area include:

- materials screening and testing of waste form, canister, and backfill materials, and study of the near-field repository environment.

- design analysis, testing, and qualification of complete engineering-scale packages.

The major technical activities associated with siting are literature surveys and field mapping; drilling of test holes; analyses of geotechnical data including laboratory analyses of drill-core and water samples; surface and borehole geophysical surveys; seismic surveys; environmental analyses; and studies of socioeconomic impacts that may affect the area around the site. The geologic repositories program is focused on the main geohydrologic areas for the first repository: the basalt flows underlying the Hanford Site in Washington, a block of welded tuff underlying Yucca Mountain at the Nevada Test Site, salt domes in the Gulf Coast States of Louisiana and Mississippi, and bedded salt formations in Texas and Utah. Screening of additional sites in other potential host rocks, such as the crystalline rocks of the Northeastern, Southeastern, and North Central regions and other media will be considered for the second repository. Data for sites which are characterized but not selected for the first repository will be fully documented and maintained so these sites may be considered again for the second repository.

Repository activities involve the design of surface and subsurface facilities and of equipment and instruments necessary to operate, test, and decommission the repository. Emphasis is being placed on the following activities:

- laboratory and field experiments to provide information in support of repository design and performance modeling. This data base will be derived from characterization of geologic samples with respect to thermal and rock-mechanics properties.

- repository design, engineering studies, and cost estimating, including studies on waste emplacement configurations, gross thermal loading, underground layouts, and sealing/backfilling. These studies support development of an in situ test plan, equipment development plan, repository design needed for the license application and eventually final design, which will be used for actual repository construction.

Exploratory shaft development activities include long-lead procurement of liners and other critical materials, site preparation work, and design and construction of two shafts at each of the three sites in repository horizons to conduct in situ site investigations into the host rock. Exploratory shaft development and in situ testing at the base of the shafts will assist in the assessment of the technical suitability of a site and will help anticipate the difficulties that may arise during design and construction of the repository.

Regulatory and institutional activities involve coordination directly with the NRC and EPA in developing and following a repository licensing plan. Other activities in this area include developing, publishing, and updating plans for characterization of sites, and preparing environmental assessments and eventually an environmental impact statement for the selected repository site. The Department conducts all phases of the program, including site characterization efforts, in consultation and cooperation with affected States, Indian Tribes, and the public. In addition, cooperative efforts with other

Federal agencies, public information, and other outreach programs are carried out. As stated earlier, the Act broadens State and local government involvement in site selection and licensing proceedings. Specifically, the Department can provide financial and technical assistance to State and Indian Tribes to: review potential economic, social, public health, safety, and environmental impacts associated with the repository's deployment; engage in appropriate monitoring, testing, or evaluation activities; provide information to residents; and request required information and make comments and recommendations. Grants equal to taxes, as required by the NWPA, to States hosting exploratory shaft development and site characterization are also provided in this category.

Under test facilities, the Department operates facilities specially designed to conduct tests to better understand the behavior of materials, waste and rock when exposed to potential or actual repository conditions, and to develop equipment and instrumentation for the repository. Cooperative international technical programs are also conducted under this WBS element.

The Department's land acquisition activities help determine the legal requirements for acquiring land for a repository. Leases and permits must be obtained for site evaluation studies on private property. Where the Department is considering sites on land managed by the Bureau of Land Management (BLM), appropriate steps must be taken in coordination with the BLM to document program requirements and plans for acquisition under the Federal Land Policy and Management Act of 1976 (FLPMA).

The project management category provides for contractual assistance and quality assurance efforts in integrating and managing the varied activities and disciplines that compose the program.

As stated earlier, the previous two pages explained the general aspects of the geologic repositories program. The following pages describe these elements in much more detail, as well as other aspects of the program as noted below.

MRS

The Department will prepare and submit a proposal to Congress in February 1986, for the construction of a Monitored Retrievable Storage (MRS) facility. The MRS is proposed to be an integral part of the federal waste management system. Its primary function will be receive spent fuel rods from commercial nuclear power plants, consolidate them, package them in sealed canisters and ship them to the repository for disposal. It will also provide temporary storage for up to 15,000 MTU of spent fuel if required. It will receive, consolidate, and package between 2,500 and 3,000 MTU of spent fuel annually. The facility will be fully licensed by the Nuclear Regulatory Commission. MRS program funding for 1987 through 1989 contained in this budget supports this proposed facility.

Transportation

The NWPA requires DOE to develop and operate a safe and efficient system to transport spent fuel and high level waste from the reactors to a repository, or to an MRS and then to a repository. The system must: have the required hardware, use traffic management procedures agreeable to all parties involved and utilize by contract private industry to the fullest extent possible. Activities within this program are currently categorized into four major tasks: transportation systems acquisition; institutional programs; environmental and economic analyses; and technology development and testing support. Recognizing that an operating transportation system is dependent on successful completion of activities in each of these groups, early emphasis is being place on activities that will require the greatest lead time to accomplish.

Systems Integration

The objective of the systems integration effort is to ensure that the possible components of a waste system, i.e., mined geolgic repositories, waste generators, near term storage, transportation and a possible MRS facility, are integrated into an efficient, safe and on-time waste management system. To achieve this objective, the systems integration effort will: identify and baseline the requirements of the total system and maintain a current description of the waste management system that meets those requirements, including the system components, functions, and critical interfaces; enhance communication among the parties responsible for various systems components and functions in order to ensure compatibility and the coordination of interfaces; develop and maintain the capability to fully assess alternative systems concepts and to determine how a change in one part of the system will affect the rest of the system; conduct well-planned and well-coordinated systems studies and recommend to the OCRWM Director improvements to the design of the waste management system, as appropriate; and, support the development and testing of equipment or processes that have the potential to improve the waste management system.

This budget request for the NWF is subdivided into six major areas: (A) First Repository, (B) Second Repository, (C) Monitored Retrievable Storage (MRS), (D) Transportation and Systems Integration, (E) Program Management and Technical Support, and (F) Debt Service.

DEPARTMENT OF ENERGY

FY 1987 CONGRESSIONAL BUDGET REQUEST

Adjustments to FY 1986 Appropriations
(dollars in thousands)

Nuclear Waste Fund	FY 1986 Appropriation	Gramm-Rudman-Hollings	General Reduction	Management Initiatives	DOE Wide FTE Reduction	Pay Restoration	Subtotal	Comparability Adjustments	Total
First Repository									
Operating expenses	$386,100	$-12,750	---	---	---	---	---	---	$373,350
Capital purchase	12,700	---	---	---	---	---	---	---	12,700
Construction	---	---	---	---	---	---	---	---	---
Total	398,800	-12,750	---	---	---	---	---	---	386,050
Second Repository									
Operating expenses	40,900	- 6,300	---	---	---	---	---	---	34,600
Capital purchase	900	---	---	---	---	---	---	---	900
Total	41,800	- 6,300	---	---	---	---	---	---	35,500
Monitored Retrievable Storage (MRS)									
Operating expenses	3,000	0	---	---	---	---	---	---	3,000
Capital purchase	---	---	---	---	---	---	---	---	---
Construction	---	---	---	---	---	---	---	---	---
Total	3,000	0	---	---	---	---	---	---	3,000
Transportation and Systems Integration									
Operating expenses	22,625	- 1,350	---	---	---	---	---	---	21,275
Capital purchase	---	---	---	---	---	---	---	---	---
Construction	---	---	---	---	---	---	---	---	---
Total	22,625	- 1,350	---	---	---	---	---	---	21,275
Program Management and Technical Support									
Operating expenses	54,735	- 2,023	---	---	---	---	---	---	52,712
Capital purchase	500	---	---	---	---	---	---	---	500
Construction	---	---	---	---	---	---	---	---	---
Total	55,235	- 2,023	---	---	---	---	---	---	53,212
Subtotal Nuclear Waste Fund	521,460	-22,423	---	---	---	---	---	---	499,037
Debt Service (Interest)									
Projected Receipts									
One mil/kwh fee	378,600	---	---	---	---	---	---	---	378,600
One-Time fee	2,300	---	---	---	---	---	---	---	2,300
Total	$380,900	---	---	---	---	---	---	---	$380,900
Interest Income	$118,000	---	---	---	---	---	---	---	$118,000

	FY 1986 Appropriation	FY 1987 Request	FY 1988 Estimate	FY 1989 Estimate
A. First Repository - Total	$386,050	$541,800	$632,400	$571,500

The objective of this program is to carry out the activities necessary to site, design, license, construct, operate, and decommission the first repository. The FY 1987 activities are presented by the specific program work breakdown structure previously discussed. The first repository program is conducted by three project offices and contractor organizations, with each organization concentrating its efforts on a potential host rock. Nine potentially acceptable sites have been identified that include two salt domes in Mississippi and one salt dome in Louisiana, and two bedded salt sites each in Utah and Texas being studied under the Salt Repository Project; a site in welded tuff at the Nevada Test Site conducted under the Nevada Nuclear Waste Storage Investigations Project; and a site in basalt at the Hanford site under the Basalt Waste Isolation Project.

The major programmatic milestones associated with the schedule for the first repository are as follows:

Milestones	Calendar Year	
o Nominate at least five sites and recommend three candidate sites to President for characterization........	April	1986
o Issue Site Characterization Plans (SCP) for basalt and tuff candidate sites......................................	December	1986
o Begin construction of first exploratory shaft............	May	1987
o Issue Site Characterization Plan for salt................	May	1987
o Start License Application design for repository..........	October	1988
o Complete performance assessments in support of Environmental Impact Statement (EIS).....................		1990
o Issue Final Environmental Impact Statement (FEIS)........		1991
o Recommend first repository site to Congress..............		1991
o Submit license application to NRC........................		1991
o Licensing completed......................................		1993-1994
o Begin operation..		1998

A. First Repository - continued

FY 1987 Congressional Budget Request	$541,800

The increased FY 1987 funding relative to FY 1986 for the first repository is mainly required for extensive site characterization, initiation of exploratory shaft construction, and intensive engineering tests and analyses to support waste package and repository designs.

1. Systems	$ 22,700

Operation of a data base management system and conduct of systems engineering analyses for each project will continue. Data entry into the technical data base will accelerate as site characterization activities progress. Project integration support will continue to ensure that data acquisition, analysis and documentation are focused on issue resolution for meeting site characterization goals prior to license application. The performance assessments of the overall disposal system will continue to consider changes in the repository and waste package designs and to analyze disruptive events and their consequences. The updated analyses will also incorporate the additional laboratory and field data compiled in FY 1986 and FY 1987. Efforts on computer code benchmarking, validation, documentation, and verification will also continue.

2. Waste Package	$ 41,100

Waste package design and development will continue at each of the three candidate sites. Advanced conceptual design for the waste packages for all sites will be underway and prototype testing will be conducted. Data from the systems integration studies in waste packaging and handling will be incorporated into the package design as appropriate.

In basalt, the corrosion and mechanical properties testing of the candidate container materials (two steels, copper, and 90-10 cupronickel) will result in a recommendation for reference and backup materials. Qualification tests will be initiated with small-scale heated model tests for packing saturation and container corrosion. Additional waste forms will be characterized and tested including high burn-up spent fuel and West Valley waste forms. Waste package environment analysis and waste package performance, reliability, and safety analysis will be performed to provide input to the preparation of waste package design requirements and to guide further testing. Initial geochemical modeling of basalt/groundwater and packing/groundwater hydrothermal interactions will be completed.

In tuff, testing will be done to determine the stability of clays and zeolites under the hydrothermal conditions that will follow waste emplacement. The phenomenon of fracture healing, observed under saturated conditions, will be investigated under conditions of unsaturated flow, and the effect of fractures on the distribution of water during dehydration and rehydration of rock under isothermal conditions and in a temperature gradient will be examined. Testing of West Valley glass under unsaturated conditions will be completed. Work will continue along two parallel efforts for stainless steels and for copper-base materials (assuming that the corrosion performance of Cu merits continuation of that alloy system). The two parallel efforts will converge at the end of FY 1987 with selection of one material. Prototype testing and data analysis will be completed on the advanced conceptual design. The preliminary waste package system model and geochemical data base will be updated and used to analyze the performance of advanced conceptual waste package designs.

A. First Repository - FY 1987 Congressional Budget Request - continued

In salt, testing will continue to further define the waste package near-field environment. Radiation and heat effects studies on brine composition will be completed. Data and analysis reports for waste form and barrier materials testing will be issued to support the waste package design specification, and data collection for performance assessment model development will be completed. The waste package design specification will be prepared utilizing data from the waste form and barrier materials testing. Welding and inspection technique demonstration testing will be completed, and large-scale package component tests will be initiated.

3. Siting.. $150,100

Site characterization activities will continue at each of the three candidate sites. A significant effort will be focused on analysis of geotechnical data to assist in the preparation of input for the Site Recommendation Report and Draft Environmental Impact Statement (DEIS). Environmental characterization and socioeconomic analyses will continue in FY 1987 for each site.

At basalt, if selected, borehole facilities will be installed to support establishment of the site flow system baseline and hydrochemical sampling. Groundwater monitoring, hydraulic testing, solute transport testing, and hydrochemical sampling will continue. Geologic characterization will continue to provide data and interpretations supportive of design and performance assessment evaluations. Borehole and surface studies will be conducted to provide input to an update of three-dimensional stratigraphic and structural model of the Reference Repository Location (RRL), which will serve as the geologic basis for conceptual geohydrologic modeling and repository design input. As part of this effort, deep boreholes will be drilled to characterize the central to eastern RRL, particularly for the purpose of assessing the potential for repository panel development in that direction if required. Evaluation of the tectonic setting of the RRL will continue through the conduct of geologic mapping, geophysical surveys, and seismic monitoring, and through an evaluation of structure-verification and other borehole data. Data acquired through tectonic studies will be used to update tectonic models of the RRL and surrounding region to document preliminary seismic design input to the repository LA design.

At tuff, if selected, the drilling program will be accelerated and will include unsaturated zone hydrologic studies. Sufficient data should be available to provide preliminary site geology and subsurface fracture description. Additional core will be obtained, described, and its physical properties measured and correlated with the geophysical logs. Soil studies and surface deposit maps to locate quaternary fault movement will also be completed. Monitoring and analysis of the regional and site seismic network will continue. The recharge modeling studies will be completed. The tracer studies will be concluded and the data obtained will be used to model the flow system in fractured rock. The travel time evaluation in the saturated zone will be completed as well as the simulated flow path through Yucca Mountain. An effort will be initiated to describe the unsaturated zone hydrologic system based on the available geologic and hydrologic data. The effects of future tectonic activity on the locations and rates of erosion will be modeled.

In salt, three hydrology clusters consisting of three wells each will be drilled into the deep aquifer. These wells will provide data to establish hydrogeologic parameters of the aquifer unit, the rate and direction of flow, and potentiometric levels for input to performance assessment modeling. The clusters will be located offsite, but within a few miles of the exploratory shaft facility to contribute to the confirmation and further development of the regional hydrologic model of the

A. First Repository - FY 1987 Congressional Budget Request - continued

setting. These are three of five clusters that are planned. The stratigraphic boreholes will be completed and drilling of approximately 400 shallow foundation within a few miles of the exploratory shaft facility to contribute to the confirmation and further development of the regional hydrologic model of the setting. These are three of five clusters that are planned. The stratigraphic boreholes will be completed and drilling of approximately 400 shallow foundation borings for repository surface facilities will be completed. Surficial geologic mapping of the site and access routes will be accomplished. Geologic analyses of data from the Engineering Design Borehole (EDBH), stratigraphic boreholes, and exploratory shaft facility borings will be performed. Regional and site-specific geologic studies will be undertaken for input to preparation of licensing and permit documents. Geophyscial surveys (seismic, gravity, magnetic, resistivity) begun in FY 1986 will be required to help resolve issues identified during the site characterization activities. The microseismic network, used to monitor seismic activity, will continue to be operated and maintained. Final decommissioning and closeout for the last of the deferred field activity locations and records turnover will be completed.

4. Repository Development.. $ 87,800

In FY 1987, the repository advanced conceptual design reports will be nearly completed for each of the three candidate sites. The development of repository LA design criteria which will be based on the previous design activities, engineering trade-off studies, and the repository data base, will be initiated. Engineering development of repository equipment and instrumentation will continue. Repository seal in situ tests will be initiated.

At basalt, samples from the exploratory shaft facility and Near Surface Test Facility (NSTF) will be evaluated in the laboratory in order to update the repository geomechanics behavior and repository functional design criteria. Detailed test designs will be prepared for in situ triaxial and direct block shear tests. Instrumentation specifications and testing requirements will be scoped to place prototype instruments in the exploratory shaft. At tuff, a full demonstration of the system for horizontal waste emplacement and retrieval will be conducted. In salt, evaluation of emplacement parameters and engineering properties for clay-based sealing materials will be completed. Rock mass characterization criteria and interim specifications for emplaced concrete/grout, salt, and clay seals will be developed. Site-specific rock testing will be performed on the potential repository horizon and adjacent nonsalt rock units. Laboratory testing in support of site characterization, repository design, exploratory shaft, and performance assessment will continue.

5. Regulatory and Institutional... $ 49,600

Site-specific data from the characterization and design activities will be analyzed for incorporation into semiannual SCP progress reports. Preparation of the license application will be initiated and close coordination with NRC and EPA will continue. Consultation with affected States and Indian Tribes, public information programs and other communications and institutional liaison activities including financial assistance to States and Indian Tribes will continue. Grants will be provided equal to taxes to States where site characterization is being conducted, as appropriate.

6. Exploratory Shaft.. $133,500

In basalt, drilling of the first shaft will be initiated and definitive design of the second shaft and subsurface excavations will be completed. Surface facility construction will proceed concurrently with drilling operation. Construction of the

A. First Repository - FY 1987 Congressional Budget Request - continued

hoist house will be completed to support the start of shaft outfitting. A readiness review and supporting safety analysis will be completed for the first shaft to support entry of personnel into the shaft for outfitting. Tests to be conducted in the exploratory shaft will be mocked up in the NSTF to train personnel and to verify the suitability of the test design for use underground. Tests will be fabricated, installed in the NSTF, and reworked as necessary when underground development in the exploratory shaft is completed.

In tuff, the exploratory shaft site preparation will be completed. Shaft sinking, lining and outfitting with internals and utilities will begin with scheduled interruptions for testing as required. Off-site development work on in situ tests will continue as will laboratory work on samples obtained during shaft construction.

In salt, field mobilization activities for construction of the exploratory shafts will be completed and all the exploratory shaft facility permits will be obtained. Site preparation and surface facility construction will begin. Procurements of instruments to be installed during the excavation of the shafts and components required for the data acquisition system will be initiated. Instruments procured will be calibrated and the acquisition system will be operated to correct any operational problems prior to installation at the site.

7. Test Facilities.. $5,200

Domestic test facilities will be operated in support of the geologic repository program and cooperative international programs will be conducted at selected foreign facilities. At basalt, the Basalt Materials Research Laboratories and the Near Surface Test Facility will be operated and maintained in support of the waste package and repository test programs. At tuff, the G-Tunnel will be maintained as a test bed for equipment development, specifically the proof-of-concept testing required for evaluation of the horizontal drilling equipment proposed for horizontal waste package emplacement. The Climax Test Facility will also be maintained to facilitate institutional interactions. At salt, the cooperative program on brine migration tests will be continued with the Federal Republic of Germany at the Asse Mine; interactions will be conducted with the Waste Isolation Pilot Plant (WIPP), evaluating WIPP data for use by the Salt Repository Project and considering in situ tests in support of project requirement; and access to the Avery Island facility will be maintained to obtain salt samples for testing.

8. Land Acquisition.. $ 7,600

The Department will continue proceedings to obtain land access for non-government owned land in the salt media needed for the repository controlled area. The intent is to protect the potential site from intrusion and new mining claims.

9. Project Management.. $ 44,200

Project management and support functions will continue to be provided for the geologic repository projects. These functions include assistance in updating project planning documents, operation of project cost and schedule control systems, financial management and budgeting, procurement and management of subcontractors, legal services, records management, and operation of a quality assurance program that meets NRC requirements.

A. First Repository - FY 1988 Estimate

FY 1988 Estimate.. $632,400

As stated earlier, the Act requires DOE to submit a triennial budget for authorization purposes. The following activities would be initiated, continued, or completed in FY1988.

1. Systems... $ 23,400

Operation of the data base management system and conduct of system engineering analyses for each project will continue. Project integration support will continue to ensure that data acquisition, analysis and documentation are focused on issue resolution in support of meeting site characterization goals prior to license application. Efforts on computer code verification, validation, benchmarking and documentation will also continue. Preliminary performance assessments will be conducted to support preparation of the draft Environmental Impact Statement.

2. Waste Package... $ 37,900

Waste package design and development will continue at each of the three candidate sites. At each site, the advanced conceptual design of the waste package will be completed. This work will enable continuing input into demonstrating the performance of the waste package in meeting the 300-1000 year containment regulatory requirement and in contributing to meeting the release rate regulatory requirements. For all projects, container materials testing will continue to provide data for input to the development of waste package designs.

In basalt, testing will accelerate in all areas including waste acceptance compliance test development, materials testing, development testing, and qualification testing. Materials testing of the reference and backup container metals will focus on corrosion and mechanical properties, long-term behavior with and without radiation, and on corrosion product characterization. Two additional small-scale, heated model corrosion tests will be operational and a detailed design will be prepared for a large-scale, heated model corrosion test. The container closure and non-destructive examination processes will be demonstrated for both reference and backup materials.

In tuff, the final laboratory scale experimental studies of the hydrologic properties of Topopah Spring tuff will involve two phase flow under unsaturated conditions in rock samples that contain multiple fractures. The chemistry of water reacted with the rock cores under unsaturated conditions during the flow experiments will be compared with that from saturated hydrothermal testing. The geochemical modeling of zeolite and clay hydrothermal reactions, and the effects of variations in water chemistry will continue. Hydrothermal interaction tests will be conducted using rock samples obtained from the repository horizon during exploratory shaft construction. Container material for the waste package final design will be selected and activities will focus on confirmatory testing on corrosion/oxidation rates and degradation modes established previously. Carbon steel borehole liner material will be examined to determine the effects of alloy composition, microstructure, and welding on the performance of the steel.

In salt, waste package environment and waste form and materials testing will continue with a report issued to support the waste package design. Single effects testing will be completed with major emphasis on expected condition interaction testing.

A. First Repository - FY 1988 Estimate

Unanticipated events testing will be initiated to support future licensing actions. Also, performance assessment of the waste package advanced conceptual design will be completed. Waste package model development will be completed and validation activities continued. Large-scale waste package component tests will also continue.

3. Siting.. $139,700

Site characterization activities will continue at each of the three candidate sites. Site characterization planning and implementation will support the exploratory shaft development program and testing, repository design, and SCP progress reports. All projects will continue monitoring the environmental impacts of site characterization. A comprehensive environmental assessment program will be implemented to support the EIS and other licensing documents. Climatic and air quality monitoring, and socioeconomic analyses will continue and will be used to support impact mitigation plans as necessary.

In basalt, geologic characterization of the stratigraphy, structure, rock chemistry, tectonic setting, and resource potential of the RRL and surrounding area will continue. Work will focus on providing data and interpretations supportive of design and hydrologic and performance assessment evaluations. Input from such analyses will be utilized to update a three-dimensional stratigraphic and structural model of the RRL, which will serve as the geologic basis for conceptual geohydrologic modeling and repository design input. Stratigraphic and structural data will be provided from exploratory shaft tests. In preparation for such work, a report will be produced on the predicted intraflow structure and primary fracture conditions in the preferred candidate horizon within the exploratory shaft. Evaluation of the tectonic setting of the RRL will continue through the conduct of geologic mapping, seismic monitoring, geophysical and geodetic surveys.

In tuff, large-scale hydraulic and tracer tests will be conducted and the data integrated with the water table description in the saturated zone hydrology model. The geologic model will be established as well as a preliminary unsaturated zone hydrology model. Data from core samples will be evaluated using standard climate-calibration techniques in order to determine past climatic conditions. The potential for radionuclide transport will be determined and solubility measurements for radionuclides specified in 40 CFR 191 will be completed. Also, the effectiveness of matrix diffusion in mitigating the release of radionuclides in fractured tuff will be demonstrated. The geothermal model of the saturated zone including a final analysis of transport in the saturated zone will be completed.

In salt, the remaining two of the five hydrology clusters will be drilled into the deep aquifer. These wells will provide data to establish hydrogeologic parameters of the regional flow system. These clusters will be located several miles from the exploratory shaft facility to contribute to the validation process of the regional ground-water flow model. Comprehensive hydraulic testing will be performed in completed wells of the deep hydrology clusters. Tracer tests and fracture flow studies will be performed. Approximately 200 wells will be drilled to the water table for the purpose of detecting changes in ground-water quality during and after the operational phase of the repository facility. Most testing on the rock from the EDBH and stratigraphic boreholes will be completed. Most soils testing will also be completed. The microseismic network will continue to be operated and maintained.

A. First Repository - FY 1988 Estimate - continued

4. Repository Development.. $126,000

Preparations to start the repository Licenses Application (LA) design will be completed for each of the three candidate sites. Engineering development of repository equipment and instrumentation and repository seal in situ testing will continue.

At basalt, rock mechanics laboratory tests will be completed using cores from the exploratory shaft. Long term studies of rock support materials will continue, a report on waste handling equipment development will be completed, and an instrumentation development plan will be prepared based on the respository advanced conceptual design. At tuff, rock mechanics analyses will determine the impact of data from the in situ experiments conducted in the exploratory shaft. Seal performance analyses will be completed and a prototype waste transporter and associated handling equipment will be fabricated for testing. At salt, final specifications for concretes/grouts used in sealing applications will be issued. Large-scale testing of emplacement and field verification of clay-based sealing materials will be completed. Work will continue on development of a field testing technique to determine the in situ stress conditions in salt over varying time intervals. This technique will aid in room and pillar design and also determine the orientation of the repository layout.

5. Regulatory and Institutional... $ 58,000

Coordination with NRC and other regulatory agencies will continue. Semi-annual SCP progress reports will be prepared. Consultation with and assistance to affected States and Indian Tribes, public information programs, and other communications and institutional liaison activities will continue. Preparation of the required license application documents will be continued at each project. Grants will be provided equal to taxes to states where site characterization is being conducted, as appropriate.

6. Exploratory Shaft... $190,600

At basalt, construction of the first exploratory shaft will be nearly completed, including grouting and lining with a 72-inch liner. The drill rig will be demobilized immediately after drilling to depth, and moved to the second shaft site. While the first shaft is being outfitted, the second shaft will be drilled. Surface construction for the second exploratory shaft will be conducted in parallel with drilling of the second shaft. The hoist house will be constructed in preparation for outfitting and acceptance of the second shaft. Training of personnel and hiring of underground crews for installation and performance of testing in the exploratory shaft will be initiated.

In tuff, the shaft and the mining subcontractor will sink, line, and outfit the first shaft with internals and utilities, and construct the shaft bottom drill room. The operating contractor will mobilize to support the testing activity. This will allow test equipment to be installed continuously in order to start tests as soon as practicable.

In salt, construction of the surface facilities will be completed and construction of both shafts will begin. The detailed test procedures required to characterize the site by subsurface monitoring and testing will be completed and instruments will be

A. First Repository - FY 1988 Estimate - continued

installed in the shafts under construction. Procurement activities will be initiated for the acquisition of the subsurface instruments, orders will be placed for long-lead and specialized equipment to be fabricated, and plans will be prepared to mobilize to the site for subsurface testing.

7. Test Facilities.. $ 4,800

Operation of domestic test facilities in support of the waste package and repository test programs will continue, including the Basalt Materials Research Laboratories and the Near Surface Test Facility at basalt, the G-Tunnel and the Climax Test Facility at tuff, and the Avery Island facility at salt. Interactions between the Salt Repository Project and the Waste Isolation Pilot Plant (WIPP) will be continued to evaluate WIPP data. The Cooperative program on brine migration tests with the Federal Republic of Germany at the Asse Mine will be completed.

8. Land Acquisition.. $ 4,000

The Department will continue to manintain land access for non-government owned land in the salt media to protect the repository controlled area from intrusion and new mining claims.

9. Project Management.. $ 48,000

Project management and support functions will continue to be provided for all geologic repository projects. These functions include assistance in updating project planning documents, operation of project cost and schedule control systems, financial management and budgeting, procurement and management of subcontractors, legal services, records management, and operation of a quality assurance program that meets NRC requirements.

FY 1989 Estimate.. $571,500

As stated earlier, the Act requires DOE to submit a triennial budget for authorization purposes. The following activities would be initiated, continued, or completed in FY 1989.

1. Systems... $ 22,100

Operation of the technical data base management system will continue, with significant additional data being incorporated from the site characterization activities and from the waste package and repository design efforts. An evaluation of the performance of the site, waste package, and repository subsystems will be conducted for input to the draft EIS. The validation of computer codes will approach completion and the analysis of radioactivity releases from the total system will provide predictions of long-term impacts and demonstrate compliance with regulations.

2. Waste Package... $ 38,000

The waste package LA design will begin early in the year, with emphasis on conducting the major performance, reliability, and safety analysis for input to the LA and draft EIS. In basalt, preliminary waste acceptance specifications will be issued in preparation for the LA. A preliminary report will be completed which describes the effects of alpha radiation on radionuclide sorption and diffusion in packing materiials. A report will be issued on the evaluation of container materials testing

A. First Repository - FY 1989 Estimate - continued

4. Repository.. $141,000

The repository License Application design will begin early in the year at each of the three candidate sites. Rock mechanics work will continue at basalt using data from the exploratory shaft. The empirical behavior of the exploratory shaft rock support systems will be defined and preparation of test designs for the instrumentation development program will begin. At tuff, rock mechanics analyses will evaluate exploratory shaft data to quantify the variability of properties as input to licensing analyses. Data and results will be forwarded to the facilities, design, sealing development and performance assessment areas as they become available. Equipment development will focus on completing the demonstrations necessary to prove that technology exists for waste emplacement and retrieval under adverse conditions. At salt, site-specific data will be integrated into the final salt creep model. Waste handling equipment demonstration testing will be completed. The final repository seal material model will also be completed, as well as the preliminary tests of backfill emplacement techniques.

5. Regulatory and Institutional... $ 64,400

Coordination with NRC and other regulatory agencies will continue. Semi-annual SCP progress reports will be prepared. Consultation with and assistance to affected States and Indian Tribes, public information programs, and other communications and institutional liaison activities will continue. Preparation of the required license application documents will be continued at each project. Grants will be provided equal to taxes to States where site characterization is being conducted, as appropriate.

6. Exploratory Shaft.. $140,900

At basalt, outfitting of both shafts will be completed. Porthole testing of the first shaft will be conducted to determine the integrity of the grout seal, and to evaluate the disturbed rock zone around the shaft. A safety analysis and readiness review to support breakout from the first shaft will be completed, and breakout and mining of the shaft station will also be completed. The Phase I test reports will be completed. Construction of the underground drifts, including installation of utilities, wire ways, electrical power, data acquisiton channels, sumps and sump pumps will be initiated.

At tuff, construction of the underground excavations and the second shaft will be completed, the test program will be implemented following completion of construction. Operations management, test direction and coordination, safety, and quality assurance personnel will be provided on a three shift per day basis. The test plan will be continually updated and coordinated with the semi-annual SCP progress reports. The operating contractor will provide site maintenance, metered power, transportation services, fire protection, first-aid/ambulance service, communications, safety, and environmental services along with operations support of the facility and direct support to the testing on a three shift per day basis.

Construction work associated with the salt exploratory shafts and supporting facilities will be nearly completed. The construction manager will operate all facilities to support in situ testing, which will begin after the two shafts have

A. First Repository - FY 1989 Estimate - continued

including corrosion and fracture mechanics tests on coupons and small-scale heated container model tests. These tests will demonstrate the validity of extrapolating coupon test data to large-scale container performance.

In tuff, the first series of hydrothermal interaction tests of Topopah Spring tuff obtained from repository depth and using water chemistry appropriate to the unsaturated zone will be completed. Assembly of the final waste package environment data base to support performance assessment activities prior to and during license application will begin. Zircaloy corrosion testing will be completed. Tests on interaction of radionuclide solutions with the very near-field rock will be completed. An integrated data base on waste form release will be finalized. The detailed specifications and drawings will be completed, and work on development of the license application design will continue. Verification and validation of the waste package system model will be completed.

In salt, in situ testing will be initiated and near-field conditions will be updated. The final waste form and materials testing laboratory reports supporting package design will be issued. Large-scale waste package component tests will completed. Long-term in situ and laboratory confirmation testing plans will be finalized. Waste package performance assessment activities supporting the license application will be initiated.

3. Siting.. $108,500

Site characterization activities will proceed at each of the three candidate sites. At basalt, hydraulic testing and hydrochemical sampling in the exploratory shaft will continue. Groundwater monitoring, hydraulic testing, and solute transport testing will continue. Analyses of the regional flow system, hydraulic properties, ground water evolution and solute transport characteristics will continue. Geologic studies will continue utilizing data acquired from surface, borehole and exploratory shaft samples. Integration and documentation of geologic data will be focused on providing geologic interpretations in support of DEIS and LA needs.

In tuff, the drilling program will be completed. A report will be issued for rock and water samples being curated and tested. The saturated zone model update will be completed. The future climate studies will be integrated and completed. The conceptual model for tuff/water interactions at Yucca Mountain will be completed. The effectiveness of Yucca Mountain in filtering particulates from groundwater will be demonstrated by laboratory as well as field measurements. Stochastic methods will be established to allow calculation of the effect of uncertainties in the Yucca Mountain properties on transport. The final geochemistry model of the saturated zone will be completed. Preliminary geologic, hydrologic, and geochemical models of the site will be provided for use in preliminary performance assessment calculations.

At salt, samples from the exploratory shaft facility will be available for testing to support development of a site-specific evaluation of the thermal, thermomechanical, and mechanical properties of the repository horizon. Laboratory testing will refine and support the in situ testing program. Stratigraphic and structural studies will continue, as will geochemical analyses of isotopes, rock-water interaction, formation brines, and clay minerology. Site hydrologic system performance analysis will be conducted, with the results provided to systems performance assessment for license application. Comprehensive hydraulic testing will be performed in all remaining completed wells. Tracer tests and fracture flow studies will be performed.

A. First Repository - FY 1989 Estimate - continued

been connected. Instrumentation installed in the shafts will be monitored, calibrated instrumentation will be installed at depth, and testing will begin. Initially, data will be obtained to verify that subsurface conditions match those predicted from the surface based characterization program.

7. Test Facilities.. $ 4,400

Operation of domestic test facilities in support of the waste package and repository test programs will continue, including the Basalt Materials Research Laboratories and the Near Surface Test Facility at basalt and the Climax Test Facility at tuff. Work will be completed at the G-Tunnel in tuff and at the Avery Island salt facility. Liaison with the Waste Isolation Pilot Plant will be continued.

8. Land Acquisition.. $ 4,000

The Department will continue to maintain land access for non-government owned land in the salt media to protect the repository controlled area from intrusion and new mining claims.

9. Project Management.. $ 48,200

Project management and support functions continue to be provided for all geologic repository projects. These functions include assistance in updating project planning documents, operation of project costs and schedule control systems, financial management and budgeting, procurement and management of subcontractors, legal services, records management, and operation of a quality assurance program that meets NRC requirements.

	FY 1986 Appropriation	FY 1987 Request	FY 1988 Estimate	FY 1989 Estimate
B. Second Repository - Total	$35,500	$78,700	$74,200	$71,500

The objective of this program is to carry out the activities to site and design the second repository as mandated by the Act. As was the case with the first repository, the second repository's FY 1987 activities are discussed by functional program work breakdown structure.

The second repository program will be conducted with decision points spaced about seven years from those for the first repository. The FY 1987 request supports a FY 1993 recommendation of candidate sites for characterization for the second repository. Potential sites to be considered for a second repository could be drawn from several sources. First, sites identified as potentially acceptable but not nominated for the first repository could be considered. Secondly, sites characterized for the first repository but not selected could be considered. Finally, sites from among geohydrologic settings and rock types not considered for the first repository but developed at a later date could, if found potentially acceptable, be considered for the second repository. Currently, the Department is conducting studies to identify potentially acceptable sites in crystalline rock in three regions of the country. The Department is also conducting studies for investigating sedimentary rock to determine if that media might contain potentially acceptable sites. The planned milestones leading to the site recommendation and license application decisions for the second repository are shown below.

Milestones	Calendar Year	
o Issue final region to area screening methodology................	April	1985
o Issue final Regional Characterization Reports..................	September	1985
o Issue draft crystalline rock Area Recommendation Report.........	January	1986
o Issue final crystalline rock Area Recommendation Report.........	November	1986
o Issue draft crystalline rock Area Characterization Plan (ACP)...	February	1987
o Issue final ACP and initiate crystalline rock area phase field investigations..	November	1987
o Recommend candidate sites to President for characterization.....		1993
o President recommends repository site to Congress...............		1999
o Submit license application to NRC..............................		2000
o Receive construction authorization from NRC....................		2002
o Begin operations..		2008

In addition to intensive study and characterization of crystalline rock formations, the program efforts include waste package design and development, repository design, geosciences, materials development, and other related technical fields.

B. Second Repository - continued

FY 1987 Congressional Budget Request.................................... $78,700

The budget request for FY 1987 reflects an increase of $43,200,000 over the FY 1986 appropriation. The increase will provide for: preparation for area phase field studies in the crystalline rock repository project; expanded cooperative efforts with the Atomic Energy of Canada Limited/Underground Research laboratory and the Swedish/Stripa projects; grants to affected States and Indian Tribes; and engineering activities related to waste package and repository design.

1. Systems.. $ 5,900

The development and application of technical integration techniques and procedures for the CRP will be a major component of this WBS element. A substantial activity will be devoted to the coordination and integration of the Area Phase Methodology (APM) which will be used in the prioritization of area phase data needs and finally in the comparative analysis required to support site nomination and recommendation in conjunction with the Environmental Assessments. The importance of public concerns relating to transportation of nuclear waste will be reflected by an emphasis in transportation-related studies in support of the area phase.

Performance assessment activities will emphasize the evaluation of postclosure radiological performance capabilities of each candidate area. Activities will continue toward the refinement and selection of fracture flow and transport models and codes that can be verified and validated for use in subsequent phases of the project, and efforts will be devoted to the acquisition and application of models to support repository and waste package design studies. The development of the CRP Technical Data Base Management System (TDBMS) will be completed, to be available for receipt of data related to the area phase.

2. Waste Package.. $ 1,100

The design bases for the waste package will be drafted and and a program plan for the development and testing of waste package materials will be prepared and reviewed. Preliminary scoping analyses of waste package performance will also be conducted in the initial application of waste package models to a repository in crystalline rock.

3. Siting... $ 45,700

The final Area Recommendation Report will be issued, following modification of the draft as appropriate in response to comments on the draft. Geotechnical work will be directed toward completing the draft Area Characterization Plan (ACP), which describes field activities to commence during the next fiscal year. The draft ACP will identify candidate-area specific plans for the conduct of investigations in geology, hydrology, geochemistry, and tectonics, as well as in the areas of the environment and socioeconomics. Preparation of the ACP will also involve interactions with the States and affected Indian Tribes through a workshop process to receive their input on studies proposed and their applicability. In addition, detailed test plans and procedures will be developed for specific field activities and are to be tested at trial study sites in Canada as part of the AECL cooperative program. These tests will include two deep drill holes at the Atikokin site in Canada and the conduct of hydrologic testing in the holes. Limited data are to be collected and reviewed on each area to be studied during area characterization. These data will include remotely sensed imagery and geologic and hydrologic data obtained from Federal and State sources. To prepare for field testing, equipment needed to perform hydrologic and geochemical tests will be evaluated and acquired.

B. Second Repository - FY 1987 Congressional Budget Request - continued

Environmental activities will include contributions to the preparation of the draft ACP, including mapping and data collection programs. Specific techniques best suited for comparatively evaluating the candidate area will be identified. Preparation of field test plans and procedures that will provide detailed guidance for the conduct of planned field investigations will be continued.

Socioeconomic activities will be conducted to support preparation of the draft ACP. Specific plans for the conduct of studies of population distribution and density, regional economics, housing, public services and facilities, government expenditures and revenues, water and other resource usage, and related topics will be formulated.

4. Repository Development.. $ 3,800

Existing repository conceptual designs from the first repository and foreign programs will continue to be evaluated. Shaft, shaft seal, and underground layout design studies will be started. The generic conceptual design of the exploratory shaft will be evaluated for potential use as one of the repository shafts. Repository design information will be provided to support State briefing meetings. Engineering design input will be provided for the geomechanics and repository design chapters of the draft Area Characterization Plan.

Procurement of a rock mechanics laboratory testing contractor for the area-phase thermomechanical data base development will be completed. This contractor will receive core samples from Stripa and the Canadian URL and begin development of the mechanical, thermal, and thermomechanical data base needed for the design of the exploratory shaft and the repository.

5. Regulatory and Institutional.. $ 8,900

Changes to the regulatory requirements will continue to be monitored and analyzed as to potential impact on the crystalline repository project. Oversight will be provided for state permitting, waste disposal-related laws and environmental laws applicable to area phase field investigations. The Regulatory Compliance Plan and Regulatory Milestone Chart will be updated to reflect regulatory changes and a preliminary draft Environmental Assessment management plan will be prepared. The Regulatory Review Group will continue to provide an independent review of regulatory activities.

Institutional activities in the communications and liaison area will focus on consulting with States and Indian tribes regarding area phase planning. Grants will be made available to affected States and Indian Tribes to support their independent review of project documents, to attend workshops and meetings, to facilitate exchange of information, and to provide mechanisms for negotiation with DOE on key issues.

6. Exploratory Shaft.. $ -0-

No activities planned.

7. Test Facilities.. $ 7,500

In a joint project effort between DOE and the Atomic Energy Canada Limited (AECL), design of the Mine-By Experiment and test plans for the Heated Block Experiment at the Underground Research Laboratory (URL) will be completed. Planning for the URL Single-Fracture Migration/Sorption, and Container/Buffer Experiments will be initiated.

B. Second Repository - FY 1987 Congressional Budget Request - continued

Instrumentation of the Mine-By Experiment will also be started. Grouting and excavation of the fracture zone at the URL will be conducted, and the shaft will be deepened to a depth of 440 meters.

Thermal/Mechanical/Hydrologic testing will be completed at the Colorado School of Mines. Long-term instrumentation testing will be planned and initiated. Cooperation on the OECD/NEA Swedish Stripa Project will continue with Phase III testing.

8. Land Acquisition.. $ 800

Activities will focus on securing all required permits for early area phase field investigations. Work will also proceed to update the Land Access/Acquisition Plan to ensure that the scope and contents of the plan are kept current in the face of anticipated legislative/regulatory changes.

9. Project Management.. $ 5,000

Activities will include contractor support in financial management and budgeting, procurement planning, administrative support services, cost/schedule planning and analysis, developing and maintaining a quality assurance program and overall planning, coordination and management.

FY 1988 Estimate.. $ 74,200

1. Systems.. $ 4,500

Increased emphasis will be devoted to the application of System Engineering concepts for the technical integration of the project. The development of the comparative analysis methodology will be refined, including the addition of a weighting process compatible with that used in the first repository nomination process. The methodology will be applied in support of the area phase activities to supply guidance in their conduct, and to allow early evaluation of their potential in satisfying the DOE Siting Guidelines. Performance assessments will be refined as better data and analytical techniques become available. The results will in turn be used with data from measurements in the candidate field areas to both substantiate the appropriateness of the codes and models and to supply guidance to the conduct of the field measurements, and to the location of the preferred initial drill site. The Technical Data Base Management System will be in operation, accumulating the project data relating to the area phase and maintaining public access to this data base.

2. Waste Package.. $ 1,600

Development of waste package design concepts will be initiated and structural and cost analyses based on the design concepts will be conducted. The thermal, chemical, and structural constraints within which acceptable waste package designs can be developed will be identified. Descriptions will be developed for waste packages containing spent fuel and other material designated as requiring disposal in a mined geologic repository.

B. Second Repository - FY 1988 Estimate - continued

Based on the waste package strategy and planning documents developed in the previous fiscal year, test plans for waste package materials and for characterization of the waste package environment will be drafted. Included will be plans for the testing of spent fuel, container materials, and packing materials and for studies of groundwater radiolysis and of thermal and radiation affects on the host rock. Also, model development and application to the assessment of waste package performance will be continued.

3. Siting.. $ 44,800

Geotechnical field investigations will begin after the final ACP is issued. Investigations on each area will focus on obtaining surface information to identify drill sites as well as provide data to refine conceptual models of the hydrology and geology of each area. Shallow drilling will be done to calibrate the geophysical model input. Outcrops of rock as well as springs and water bodies will be sampled for geochemical analyses to evaluate surface geochemical conditions that may indicate connection to deep flow systems. Hydrologic surveys of existing wells and water bodies are to be done to provide information for refining the hydrologic conceptual model.

Environmental activities will be focused on the conduct of field investigations. The initial thrust of these activities will be to perform those reconnaissance level field studies and verifications required to support the identification of specific drill sites. Environmental investigations will foucs on aquatic ecology, terrestrial ecology, meterology, climatology, air quality, surface water hydrology, background radiation, topography, soils and on/off-site hazards analyses, land use and status, cultural, archaeological, and historical resources, and aesthetics. Development of the Area Phase Methodology will be refined as information is collected during the fiscal year.

Socioeconomic investigations will concentrate on the following topics: population density and distribution; regional economics; housing; public services and facilities; government expenditures and revenues; water and other resource usage; recreational resources/facilities and transportation. Information will be obtained from open literature/secondary sources and from field reconnaissance investigations. This information will be collected to prepare or update existing baseline socioeconomic maps and data.

4. Repository Development.. $ 2,600

Geologic field testing and environmental and socioeconomic data collection during the intial area phase investigations will be factored into design of repository shaft, shaft seals, and surface/underground layouts. Laboratory rock mechanics testing will continue. A sealing materials test plan will be developed to support scheduling and cost estimates for sealing materials characterization and design data development. Development of performance assessment codes will be started to conduct analyses of the performance of the repository structures and engineered barriers within the geologic site.

5. Regulatory and Institutional.. $ 8,400

Changes to the regulatory requirements will continue to be monitored and analyzed as to potential impact on the crystalline repository project. Regulatory interpretation and guidance will continue to be provided to support activities conducted in the latter portion of the area phase. Oversight will continue for state permitting, waste disposal-related laws and environmental laws applicable to area phase site

B. Second Repository - FY 1988 Estimate - continued

investigations. The Regulatory Compliance Plan and Regulatory Milestone Chart will be updated to reflect changes in the environment. A revised draft EA management plan will be prepared as well as a preliminary draft SCP management plan. The Regulatory Review Group will continue to provide an independent review of regulatory activities.

Institutional activities in the communications and liaison area will focus on consulting with States, Indian Tribes, legislators, citizens groups, and other involved constituencies regarding the nature of field work activities. Grants will be made available to affected States and Indian Tribes to support their independent review of work being conducted, to attend workshops and meetings, to facilitate exchange of information, and to provide mechanisms for negotiation with DOE on key issues.

6. Exploratory Shaft.. $ 300

Generic exploratory shaft conceptual design requirements will be developed using experience gained from the first repository and international programs. The development of an in situ test program will be initiated for a typical crystalline rock mass. The planning will include indentification of key parameters such as in situ stress state and hydraulic conductivity.

7. Test Facilities.. $ 7,200

Instrumentation of the Mine-By Experiment at the AECL Underground Research Laboratory (URL) will be completed, and excavation for the test will begin. Design of the Block Experiment will be completed, as well as planning for the Migration/Sorption Experiment and the borehole sealing investigation. Shaft characterization activities at the URL will also be completed, and excavation of the lower level will begin. Test planning for the pressure chamber will be initiated.

Participation in the Swedish Stripa Project will continue, as will cooperation with the Swiss and French programs with a limited staff exchange and data transfer between programs.

8. Land Acquisition.. $ 600

Land access activities, including detailed planning required to help ensure land access for area phase investigations, will be continued. Also, planning will begin for the land acquisition required for site characterization. The Land Access/Acquisition Plan will be updated.

9. Project Management.. $ 4,200

Activities will include contractor support in financial management and budgeting, procurement planning, administrative support services, cost/schedule planning and analysis, developing and maintaining a quality assurance program, and overall planning, coordination and management.

B. Second Repository - continued

FY 1989 Estimate	$ 71,500

1. Systems	$ 4,000

Systems engineering activities will be continually applied to the project technical integration. The APM will be in use on a continuing basis to compare the potentially acceptable sites and assess the need for and validity of area phase data. Performance assessments of potentially acceptable sites will continue, using the increasingly detailed and comprehensive data from field activities. The TDBMS will be in full use as the central technical data base for the CRP.

2. Waste Package	$ 1,700

The development of waste package design concepts will be continued and a proposed waste package description will be prepared. The study of waste package components will be completed. The draft test plans for waste package materials and environment will be completed. The procurement of test materials and equipment will be initiated. Performance assessment of waste packages using area-phase data will be initiated.

3. Siting	$ 43,200

Field investigations in each area will continue with the emphasis shifting from surface oriented studies to subsurface investigative techniques. Drilling and coring of holes will be done to obtain information on the at depth rock properties and structures such as faults and fractures. Testing will be conducted at the proposed repository level to determine in situ geologic, geochemical, geomechanical, and hydrologic parameters. The drilling program will include shallow and deep holes drilled at selected locations either within the area or immediately adjacent to it. The objective of the drilling will be to characterize the subsurface conditions adequately to refine the geologic and hydrologic conceptual models of the area for comparative evaluation and mathematical modeling purposes. Geochemical analyses will be performed on rock and water samples obtained from drilled and cored holes. The holes will also be tested using geochemical probes to determine in situ geochemical properties to evaluate waste/rock and water/rock interactions. All holes will be geophysically logged and hydrologically tested using straddle packers to provide data on the in situ hydrology and geologic conditions.

Environmental and socioeconomic field investigation activities will be continued. Data collected in FY 89 from these activities will be utilized, along with previously compiled data, to improve the environmental and socioeconomic sector models.

4. Repository Development	$ 4,500

The review of existing repository conceptual design efforts from the first repository and international programs will continue. The sealing design studies will be updated to provide input to the sealing materials laboratory testing efforts. Engineering design studies on shafts and subsurface excavations will continue, and design modifications will reflect geotechnical and geohydrologic borehole information obtained during area-phase field testing. The systems description will be updated based on information from the design studies.

B. Secondary Repository - FY 1989 Estimate - continued

Thermomechanical laboratory rock properties data will continue to be developed with core samples obtained from the potentially acceptable sites. This new rock mechanics data base will be put into the technical data base and be used in updating shaft and underground excavation designs. Performance assessment codes will continue to be developed for evaluation of repository conceptual designs.

5. Regulatory and Institutional.. $ 7,900

Changes to the regulatory requirements will continue to be monitored and analyzed. State related regulatory activities will begin the transition from area phase requirements to detailed site characterization permitting requirements. The Regulatory Compliance Plan and Regulatory Milestone Chart will be revised as required. The EA and SCP management plans will be finalized and preparation made for EA/SCP public hearings. Preparation of draft EAs will be initiated. The Regulatory Review Group will continue to provide an independent review of regulatory activities.

Institutional activities in the communications and liaison area will focus on consulting with States, Indian tribes, legislators, citizens groups, and other involved constituencies regarding field work activities. Grants will be made available to affected States and Indian tribes to support their independent review of work being conducted, to attend workshops and meetings, to facilitate exchange of information, and to provide mechanisms for negotiation with DOE on key issues.

6. Exploratory Shaft.. $ 700

The exploratory shaft conceptual design requirements will be completed using experience from the first repository and international programs. In situ test planning will be continued incorporating technology from the field testing projects at Stripa, URL, Grimsel, CSM, and Climax.

7. Test Facilities.. $ 4,700

The Heated Block Experiment at the AECL Underground Research Laboratory, (URL) will be started as well as Phase I of the Migration/Sorption Experiment. All planning for presently identified experiments will be completed. In addition, the construction of the lower test level URL will be completed and additional test planning for this location initiated.

Testing within the OECD/NEA Swedish Stripa Project will continue. A status report on test results and conclusions will be completed. Cooperation with the Swiss and French programs will involve a cooperative workshop with data exchanges between both programs continuing.

8. Land Acquisition... $ 600

Land access activities, including detailed planning required to help ensure land access for area phase investigations will be continued. Annual updates to the CRP Land Access/Acquisition Plan will be continued.

9. Project Management... $ 4,200

Activities will include contractor support in financial management and budgeting, procurement planning, administrative support services, cost/schedule planning and analysis, developing and maintaining a quality assurance program, and overall planning, coordination and management.

	FY 1986 Appropriation	FY 1987 Request	FY 1988 Estimate	FY 1989 Estimate
C. Monitored Retrievable Storage (MRS) - Total.......	$ 3,000	$46,000	$50,000	$53,000

Section 141 of the NWPA instructs the Secretary of Energy to prepare a proposal for construction of one or more MRS facilities. The NWPA states that the proposal to Congress shall include the establishment of a federal program for the siting, development, construction, and operation of such facilities; a plan for funding the construction and operation of such facilities; a plan for integrating the facilities with other storage and disposal facilities authorized in the NWPA; and site-specific designs and cost estimates. The proposal is to be accompanied by an environmental assessment. The proposal and accompanying documents are being submitted separately to the Congress.

The MRS facility is proposed to be an integral part of the federal waste management system. Its primary functions will be to receive spent fuel assemblies from commercial nuclear power plants, consolidate them (i.e., disassemble them to reduce their volume), package them in sealed canisters, and ship them to the repository for disposal. It will also provide temporary storage for up to 15,000 MTU (metric tons uranium) if required. It will receive, consolidate, and package between 2500 and 3000 MTU of spent fuel annually and be subject to full licensing by the Nuclear Regulatory Commission (NRC).

The proposed site for that facility is on the Clinch River in Tennessee approximately 25 miles west of Knoxville and adjacent to the DOE's Oak Ridge reservation. The site is within the Roane County portion of the city of Oak Ridge and is already owned and is in the custody of the Tennessee Valley Authority. It was previously planned to use this site for the Clinch River Breeder Reactor which was cancelled several years ago.

The proposed MRS facility can be operational approximately 10 years after the date of Congressional approval. Initial operation will be at a reduced rate, with operation at full rates achieved about 15 months after initial operation. The MRS facility will service the first repository, and decommissioning of the facility will be completed approximately 4 years after operations cease.

The Nuclear Waste Policy Act requires that the proposal to Congress provides for completion and operation of the MRS facility as soon as practicable following Congressional approval. This requires full funding of all activities on the critical path to facility deployment which are described in the program plan accompanying the proposal to Congress. The major near-term effort is preparation of the definitive design which is needed to prepare an application to the NRC for a license to construct the MRS. To submit the license application, the DOE must develop sufficient information on design, the expected performance and on the potential environmental effects of the facility so that the NRC can access the regulatory compliance. The license application requires a complete definitive design of those portions of the facility that are related to assurance of public health and safety. Design of other portions of the facility (i.e., the administration buildings) will continue after the license application is submitted. Several related efforts will be initiated in parallel with and to complement the final design efforts including preparation of environmental and safety analyses to support the license application. These efforts will generate information requirements as well as provide information to final design activities.

C. Monitored Retrievable Storage (MRS) - continued

Thirty (30) months are projected for the NRC review, issuance of an Environmental Impact Statement (EIS), and the granting of a license. Following receipt of the license from the NRC, the approximately 4-year construction effort for the facility will begin. After construction is completed there will be approximately 1 year of testing and demonstration before the facility becomes operational.

Also critical to the successful and timely deployment of the MRS will be the immediate establishment of an effective working relationship among the DOE, the State of Tennessee, units of local government and other Federal agencies. Funding to support these activities is also proposed.

FY 1987 Congressional Budget Request - MRS total........................	$46,000

The FY 1987 budget request is $43,000,000 greater than the FY 1986 appropriation. The increase will provide for implementation of the MRS associated activities set forth in the MRS proposal as summarized below.

The major activities and supporting funding currently envisioned as necessary in FY 1987 are as follows.

1. Design..	$14,600

The design element involves efforts to verify and finalize the designs prepared for the MRS submission to Congress.

The collection of new site data and verification of previously provided data will be completed. A design contractor will be selected to finalize the designs included in the MRS proposal and to incorporate the updated site-specific data gathered. Design studies will be performed to optimize process flows and determine trade offs that minimize radiological exposure and cost and ensure plant safety, reliability, maintainability and operability. Definitive designs needed for licensing, procurement, construction and operation will begin. Specific tasks include:

- Complete site data collection;
- Selection of the design contractor;
- Perform design studies for selecting canister configuration interfaces, transportation cask interfaces and equipment designs, and evaluate design alternatives to minimize exposure and cost;
- Begin detailed design drawings for licensing, procurement, construction and operation;
- Begin feature tests for equipment to be adapted for use in the MRS;
- Prepare test plans for specialized equipment.

2. Regulatory and Institutional...	$21,500

The NWPA requires NRC licensing of the MRS and this will be implemented through a Regulatory Compliance Plan that will delineate the steps for obtaining the necessary

C. Monitored Retrievable Storage (MRS) - FY 1987 Congressional Request - continued

permits and licenses required by Federal, State and local governments. The license from NRC will require a substantial amount of documentation including a safety analysis report, environmental analyses, studies to support the license application and to meet NEPA requirements, and a comprehensive quality assurance program.

Funding is required to support the institutional measures recommended in the proposal to Congress. This includes funding to support intergovernmental efforts agreed upon in a binding consultation and cooperation agreement between the State of Tennessee and DOE and to support financial assistance payments to the State and local governments. As discussed in the proposal to Congress, this funding will provide the State and local governments fair and reasonable financial assistance to prevent or mitigate the effects of MRS construction and operations and provide for meaningful State and local participation in developing and evaluating policies, plans and designs for the implemention of the MRS project. Funding for other activities agreed upon in the consultation and cooperation agreement between The Department and the State would also be provided.

Discussions will be initiated with the NRC to confirm the scope of environmental data and analyses needed to support the license application. In addition, discussions with State and local officials will assist DOE in scoping the issues that need more detailed evaluation. Based on these discussions, detailed analyses of field data needed to estimate the environmental impacts will begin. These data will be used in the preparation of environmental documentation that will accompany the license application to the NRC and meet DOE obligations under the National Environmental Policy Act (NEPA).

3. Systems Support and Program Management.. $9,900

This funding will support Headquarters and field management efforts to deploy the MRS facility in accordance with the Congressionally authorized MRS Program Plan. Necessary management activities for the timely implementation of MRS include (1) finalization of an acquisition strategy for contracts involving design, construction, and operation of the facility; (2) development of an MRS Project Management System including supporting management procedures for control, monitoring and reporting progress of program activities; (3) development and implementation of a quality assurance program consistent with DOE and NRC standards; (4) development and initiation of overall MRS systems engineering; and (5) establishment of a program planning and control activity to help maintain program schedules, measure and analyze performance.

FY 1988 Estimate.. $50,000

1. Design... $25,000

Work will continue on the definitive design and design verification. During FY 1988, design information needed to support submission of the license application to the NRC will be completed. Testing of the Sealed Storage Casks (SSC) to be used for storage of the consolidated and canistered spent fuel will be initiated. Feature tests (tests performed to verify conceptual design choices for individual components, equipment, processes, and materials) will be completed.

2. Regulatory and Institutional.. $17,000

The Safety Analysis Report (SAR) will be completed, containing a safety assessment of the final design of all structures, systems, and components important to safety. Consultation and cooperation with the State and local governments, and other

C. Monitored Retrievable Storage (MRS) - FY 1988 Congressional Estimate - continued

communication and institutional liaison activities including financial assistance to the State and local governments will continue. Work will continue in support of the environmental documentation to support the license application and NEPA requirements that will be needed. Other activities will be to monitor and guide other program elements such as design, construction, and decommissioning, whose activities could potentially impact the environmental activities.

3. Systems Support and Program Management.................................... $8,000

The Department will continue to support contracted services for assistance in updating project planning documents, operation of project cost and schedule control systems, procurement and management of subcontractors, records management, and operation of a quality assurance program that meets NRC requirements.

FY 1989 Estimate.. $53,000

1. Design... $29,400

Work will continue on the definitive design and design verification. SSC performance testing will be completed. The performance testing, as well as the accumulated experience with cask storage, will provide assurance of safe, reliable operations and accurate cost estimates. Development of technical specifications and planning for equipment acceptance and quality assurance testing will begin.

2. Regulatory and Institutional... $14,900

Coordination with NRC and other regulatory agencies will continue. Activities committed to in the consultation and agreement with the State and local governments, and other communications and institutional liason activities will continue, including finanical assistance payments. The MRS license application will be submitted to NRC and docketed, including the necessary environmental documentation. This environmental documentation will discuss the potential environmental impacts (and mitigation of those impacts) resulting from construction and operation of an MRS facility at the Clinch River site.

3. Systems Support and Program Management.................................... $8,300

Management support services including contract assistance, subcontract procurements and management, project cost and schedule control, and quality assurance will continue in FY 1989.

4. Training & Testing... $400

Planning activities for training and testing will be initiated in FY 1989. These activities are directly related to the NRC license application. Activities in this program element are designed to ensure that the MRS facility and operations staff can safely perform their intended functions at the required throughput rates and in a manner that is consistent with product quality requirement. Overall work to be undertaken in this element includes reviewing the design of MRS for operability and maintainability, preparing operations and maintenance manuals and procedures, monitoring construction, performing construction acceptance tests, preparing training manuals, training facility personnel, and conducting preoperational systems tests. The training and testing plans will be part of the NRC license application and will be reviewed by the NRC.

	FY 1986 Appropriation	FY 1987 Request	FY 1988 Estimate	FY 1989 Estimate
D. Transportation and Systems Integration - Total	$ 21,275	$33,375	$33,800	$31,050

This task provides for the continued development of transportation and integrated systems for the shipping and management of nuclear waste among the various components of the disposal system. This activity is divided into: (1) Transportation and (2) Systems Integration.

FY 1987 Congressional Request.. $33,375

1. Transportation.. $19,175

The FY 1987 budget request is $9,250,000 greater than the FY 1986 appropriation. The increase will provide for: execution of transportation cask development contracts which will also require increased support of outreach and institutional activities; implementation of the Institutional Plan issued in FY 1986; increased efforts in economic and environmental analyses required to provide route specific information for the environmental impact statement; and continued development of technology and data systems to aid in issue resolution for institutional obstacles that may impede transportation system development or generate increased costs.

The NWPA assigns DOE the responsibility to transport spent fuel and high level waste from its sources at the reactors to a repository (or to an MRS and then to a repository). The full development of a safe, efficient transport system to meet this responsibility, utilizing the private sector to the maximum extent possible, will take at least ten years. The system must have the required hardware and be set up using traffic management procedures agreeable to all parties involved. Environmental impacts and institutional issues attendant to an operating system must be carefully considered during the system design stage. Activities within this program are currently categorized into four major tasks: transportation systems acquisition; institutional programs; environmental and economic analyses; and technology development and testing support. Recognizing that an operating transportation system is dependent on successful completion of activities in each of these groups, early emphasis is being placed on activities that will require the greatest lead time to accomplish.

Early support for private sector development of new, efficient cask designs is particularly important. Existing casks are available but not of sufficient capacity or number to satisfy the estimated need. In order to have a new cask fleet available prior to 1998, cask design efforts must proceed in FY87. The increased payloads and improved handling characteristics to be derived from new designs will more than offset early expenditures for the development and demonstration of several new prototypes. Potential savings during operation lifetimes could amount to $2 billion.

Though efficiency is the primary justificaton for development of casks, safety will be the overriding design criterion. Applied development efforts that may prove desirable or necessary during the early design process will be initiated as will efforts for independent testing of scale models of designs that are being developed. Development efforts will be limited to those which have direct applicability and which have significant safety or cost savings implications. The majority of funding for FY87 will be used to complete preliminary cask design efforts initiated in late FY86, to plan for testing, and to develop needed data for cask design.

D. Transportation and Systems Integration - FY 1987 Congressional Request - continued

For planning purposes, economic assessment activities will continue as cask designs evolve. The use of dedicated trains and truck convoys will be evaluated as will the impact of transportable storage casks that may be used by utilities. The economic studies are closely tied to environmental impact studies for the first and second repositories as well as the MRS should it be approved. FY87 funding will allow updating of economic assessment as well as gathering data to support environmental impact statements. Route specific analysis will be of major importance to completion of programatic environmental impact statements.

In the institutional area, FY87 funding will support implementation of the Institutional Plan issued in FY86. A primary focus of activity will be issue resolution. Responding to NWPA direction indicating coordination with States, Tribes, and the public as well as maximum utilization of the private sector, DOE will obtain (by means of contracts) analyses and subsequent recommendations from States, Tribal, and local governments and their representative organizations as well as from other authoritative sources. The resulting analytical data base will support OCRWM in addressing institutional obstacles that threaten to greatly impede, if not preclude, spent fuel transportation and significantly increase its cost. Through this interaction, OCRWM expects to develop consensus policy positions and plans relating to route selection, emergency response, liability, mode of transportation, operational safety, cask testing, and other specific issues. A second institutional focus will be to develop the resources required to provide the interested public with generic transportation materials as well as information on OCRWM policies and programs.

2. Systems Integration.. $ 14,200

The FY 1987 budget request is $2,850,000 greater than the FY 1986 appropriation. The increase will provide for: development and conduct of prototypical demonstrations of dry rod consolidation techniques aimed at developing efficient and cost-effective waste handling and packaging equipment; and accelerated waste management systems integration activities supportive of issue resolution of interface and logistic problems between the waste generators, handling and packaging operations and repository operations.

The objective of the systems integration effort is to ensure that the possible components of a waste system, i.e., mined geologic repositories, waste generators, near-term storage, transportation and a possible MRS facility, are integrated into an efficient, safe and on-time waste management system. To achieve this objective, the systems integration effort will identify and baseline the requirements of the total system, conduct and coordinate studies to improve the system, fully assess alternative concepts, support equipment or process development and ensure compatability of the component interfaces.

System integration activities in FY 1987 will include updating and further implementation of the Systems Engineering Management Plan to develop the technical baseline for the waste management system. A System Requirements and Design Description, developed in FY 1986 to baseline the system, will be revised to reflect the current integrated waste management concept. System performance assessments will be conducted taking into account the latest cask systems, handling and storage capabilities at reactors, updated repository receipt rates and advanced packaging and handling equipment. Assessments of system cost and performance models, risk analysis

D. Transportation and Systems Integration - FY 1987 Congressional Request - continued

studies and alternative strategies will be performed and improvements made where indicated. Engineering development of various waste handling and packaging concepts will be advanced to optimize overall system performance in terms of safety, cost effectiveness and schedule. Optimization of waste packaging and handling techniques such as waste consolidation and packaging equipment could streamline many packaging and handling operations expected to occur at repository surface facilities or possible MRS facilities. Several major benefits could be realized from early consideration of means to minimize design redundancy for multiple candidate repository surface facilities and simplify licensing, construction and operations with a reduction in associated costs. Multi-purpose casks, if practical, can provide significant overall system improvements whether or not an MRS is authorized. FY 1987 efforts will also address interface and logistic problems between the waste generators, handling and packaging operations and repository operations. The results of systems analysis and testing will be provided to the Transportation and Geologic Repository Programs on an ongoing basis for incorporation into system and facility designs.

A major thrust of the FY 1987 system integration program will be developing and conducting prototypical demonstrations of dry rod consolidation techniques and developing competitively selected projects for consolidation/packaging equipment and multi-purpose canisters. The fuel rod consolidation activity will integrate the rod consolidation design efforts for the proposed geologic repositories for the purpose of developing efficient and cost-effective equipment for this process. The consolidation system design will be required to operate at specified waste acceptance rates at either a repository or MRS facility. Multiple designs will be competitively selected for further development into prototype hardware.

FY 1988 Estimate..	$33,800
1. Transportation..	$20,300

The FY 1988 funding will allow continued activities in each of the four major tasks: system acquisition, institutional programs, environmental and economic analyses, and technology development and testing support. The cask design efforts should provide final engineering designs and development of significant portions of the safety analysis reports needed for application to the Nuclear Regulatory Commission for a certificate of compliance. The designs should be adequate to allow engineering tests to be conducted independently by the DOE on scale models.

The casks being designed will be able to transport the majority of fuel and will be able to service the majority of reactors. Additional cask designs or design modifications will be needed to service the unusual facilities which may have limited access or non standard fuel. FY88 funding will allow development of these casks to begin as well as planning for even more advanced cask designs that could be employed if an MRS were introduced into the waste management system. FY88 funding will also provide for a study of how to best operate the system once the hardware is in place.

The primary focus of the environmental and economic analyses will be to continue gathering route-specific input data. Negotiations with potential carriers will begin in earnest.

D. Transportation and Systems Integration - FY 1988 Estimate - continued

FY88 institutional activity continues the initiatives of FY87. The results of the broad-based analytical effort to support issue resolution will be evaluated for incorporation in OCRWM planning documents and strategies. Production of public information resources will continue.

2. Systems Integration.. $13,500

Engineering development activities underway in FY 1987 to design and fabricate prototypical hardware for rod consolidation at a repository or MRS will continue into the test verification and operations phase. Prototypes of packaging/handling equipment will be fabricated and testing initiated.

Reactor-by-reactor waste shipment schedules will be refined. Waste form and packaging assessments will be upgraded in the area of disposal economics by incorporating the results of Title I design of the first repository, including preliminary design of the second repository. Systems integration activities will continue to assist the Office of Geologic Repositories in their waste package design and development activities. Coordination with the transportation activities will continue as economic and design data are compiled.

Interface details between handling at reactors, in transit, at interim storage facilities and at receiving, packaging and handling facilities will continue to be refined to assure safe, efficient, and economical waste systems operations. Technical and institutional issues will continue to be resolved.

FY 1989 Estimate.. $31,050

1. Transportation.. $23,050

The designs for the first fleet of casks will be nearly complete and the safety analysis reports for their designs will be submitted to the Nuclear Regulatory Commission for their review and approval. DOE will have to remain responsive during this certification process. In order to meet the aggressive schedule, long lead time items will be purchased for the cask prototypes. Testing of scale models will be conducted.

Activities related to the specialty casks and advanced concepts will continue as will the development of a request for proposal for a service contractor(s) who would be responsible for operating the transportation system. The applied development program will be supported as needed to complete designs or prepare for cask fabrication.

The environmental and economic analyses will have two major tasks upon which emphasis will be placed: (1) support for the first repository and MRS (if needed) environmental impact statements and (2) evaluation of cask designs for the least total life cycle risk and cost if they were to be incorporated into the transportation system. Heavy reliance will be placed on route-specific information.

In FY89 institutional activity among the participants in the analyis and interaction network will continue as decisions lead to issue resolution or to new approaches for addressing issues. Public information activities will expand as system definition becomes more precise and detailed.

D. Transportation and Systems Integration - FY 1989 Estimate - continued

2. Systems Integration.. $11,000

Integration studies and analyses of the waste management system will continue to support the transportation and geologic repository activities. Verification testing and performance analyses of prototype packaging/handling equipment and fuel consolidation techniques will near completion.

Interface details between reactor handling capabilities, transportation fleet cask designs, interim storage and packaging and handling facilities will be further refined to assure an optimized integrated waste management system. Waste scheduling activities will continue to be coordinated with transportation and repository facilities. Economic assessment of latest system designs and strategy options will continue to be conducted.

	FY 1986 Appropri-ation	FY 1987 Request	FY 1988 Estimate	FY 1989 Estimate
E. Program Management and Technical Support..................	$53,212	$69,474	$72,664	$72,192

The funding for this task provides the technical effort necessary to integrate the program and covers the costs of the Federal employees who manage the Nuclear Waste Fund. This activity is divided into: (1) Technical Support and (2) Program Management.

FY 1987 Congressional Budget Request - Program Management and Technical Support - Total..	$69,474
1. Technical Support..	$48,890

This request represents an increase of approximately $15,600,00 over FY 1986 levels. Additional funds are required for increased level of effort on technical support integration and coordination of the Civilian Radioactive Waste Management Program, defense waste studies including waste package design and development testing, and to initiate technical services to support preparation of the Environmental Impact Statement for the first repository and environmental analysis. Other increases include outreach associated with educational activities, technical support for policy issues and evaluation of waste package designs, financial assistance to national organizations, siting analysis/assessment and development and analysis of performance assessment models used by the repository projects.

This task provides for (a) technical support integration (b) fuel storage and monitoring, (c) development of standard materials characterization methods by the Material Characterization Center (MCC), (d) supporting studies including fund management activities, (e) outreach activities, (f) technical support for policy issues and program management, (g) international activities.

a) The technical support integration task provides funding for the program technical support contractor to assist OCRWM in planning and reviewing the numerous activities associated with the overall waste management disposal system. Specific contractor tasks include providing technical assistance support directly to program analysis and system engineering, total system life cycle cost studies, schedule analysis, performance modeling, cost trade-off studies, reviewing site characterization plans, assistance in implementing a state and tribe interaction program, reviewing environmental assessments, analytical support on technical policy issues and writing and reviewing safety assessments to support licensing. The contractor is also reviewing design of shafts, surface facilities, and underground excavation for a repository and assisting the DOE in coordinating the program.

b) The shipment of spent fuel at the E-MAD facility off the Nevada Test Site (NTS) to Idaho National Engineering Lab (INEL) is expected to be completed in FY 1986. FY 1987 funding is required to receive, handle and consolidate fuel assemblies from the E-MAD facility. These assemblies will be placed into storage as consolidated fuel and will be instrumented for long-term monitoring.

E. Program Management and Technical Support - FY 1987 Congressional Request - continued

c) The Materials Characterization Center (MCC) task is an integrated approach to study potential waste package materials and provides for the development of standard test procedures, reference test material, and data accumulation. DOE will continue the development of larger scale radioactive waste system tests including near-field hydrology tests that simulate realistic geologic repository environments.

d) The supporting studies include systems support, annual fee verification and calculation studies, financial audit services for the Fund, and the OCRWM component of the Nuclear Science and Engineering, Health Physics and Radioactive Waste Management Fellowship Program. The systems support is for tasks that provide technical and economic information to assist in the planning baseline for waste to be transported and received by a mined geologic disposal system. Additionally, support will be provided for the evaluation of waste package designs; the coordination of international technical information; geoscience analysis; the development and analysis of performance assessment models used by the repository projects; the development of the Environmental Impact Statement; and defense waste studies.

e) The outreach program effort involves developing publications, audiovisuals, exhibits and a plan for a national, state, regional, and local education on basic national issues.

f) Other technical support efforts include analysis of technical policy issues requiring program - wide evaluation and management support services to provide a general overview of program execution. This overview includes evaluations in program scheduling, program integration, performance evaluations, quality assurance and safety.

g) The thrust of international program efforts is to assure adequate international cooperation as well as review foreign waste policy activities, develop procedures, and provide technical participation at international meetings.

Also, included under this item are fund management activities. As stated earlier, the primary source of revenues to finance the nuclear waste disposal program is the 1.0 mill per kilowatt-hour fee charged for all commercial electricity generated by civilian nuclear powerplants beginning April 7, 1983. Another major source of revenues is anticipated from fee payments by the Department of Energy for the disposal of Defense high-level waste. The precise amounts of these fees have not been finally determined and, therefore, are not included in the revenue estimates of this request. Since the Act provides for annual review and adjustment to ensure that the revenues from the fee are sufficient to fully recover all program costs, this Office is engaged in a systematic effort, with the assistance of the Energy Information Administration, Pacific Northwest Laboratory, Oak Ridge National Laboratory, and other support contractors, to (1) gather and validate annualized life cycle cost data for each program element; (2) prepare annualized life cycle cost estimates for both reference and sensitivity cases; and (3) analyze and model total system costs and revenues to determine if the current fee is sufficient to meet the full cost recovery requirement. Progress continues to be made in refining revenue and program cost data through improved analysis methods and computer models.

Because of the high visibility of this program, OCRWM has engaged an independent accounting firm to audit the Fund on an annual basis. The auditor's primary responsibility is to attest to the fairness of financial representation of the Nuclear

E. Program Management and Technical Support - FY 1987 Congressional Request - continued

Waste Fund financial statements. The audit will be done in accordance with generally accepted auditing standards and in conformance with generally accepted accounting principles and GAO standards. The public accountant, acting independently and in a professional capacity, adds the necessary credibility to the financial statements so they may be relied upon by all interested parties.

It should be noted that the Act requires GAO to conduct an annual audit of the Nuclear Waste Fund. Also, at the request of the Senate, GAO will engage a second team of auditors to report on a quarterly basis. Further, the DOE Inspector General's staff will conduct certain audit functions independently. In each case, all auditors will exchange working papers to ensure that there is no duplication of efforts and to ensure that the Nuclear Waste Fund is operating in the most cost-effective manner.

2. Program Management.. $20,584

An increase of approximately $121,000 in this category is primarily due to other administrative support costs not identified in the base. These activities include printing and reproduction, computer maintenance, training, administrative services and materials and supplies.

The program management task covers salaries, benefits, awards, travel and contractual support services. Contractual support services include ADP data base development and training and other support services such as printing and reproduction, office space and equipment rental, postage, telecommunication, materials and supplies etc. A detailed allocation of the Program Management request follows:

	Congressional Request		
	FY 1987	FY 1988	FY 1989
Personnel Compensation	$12,756	$12,756	$12,756
Personnel Benefits	1,648	1,648	1,648
Travel and Transportation of Persons	1,416	1,473	1,528
Contractual Services	4,764	4,388	4,541
Total	$20,584	$20,265	$20,473

a. Program Mission and Functions

Section 304 of the NWPA established the Office of Civilian Radioactive Waste Management as a separate DOE organization whose Director reports directly to the Secretary. The broad mission of OCRWM is to provide for the deployment of repositories for disposal of high-level radioactive waste and spent fuel, and for the development of storage and transportation capabilities in a manner that fully protects the public health and safety. OCRWM's management organization is consistent with DOE's philosophy of decentralized management of individual projects, coupled with centralized planning and control. Accordingly, headquarters provides policy guidance, general program direction, and technical review, while project offices and contractors are responsible for the execution of projects, providing day-to-day guidance for the major contractors engaged in NWPA mission activities. Staffing for program support from other DOE Headquarters organizations is also included in this request.

E. Program Management and Technical Support - FY 1987 Congressional Request - continued

1. Headquarters: The functions of OCRWM headquarters fall into five categories of activities for which staffing is required: (1) program direction, (2) policy and outreach, (3) geologic repositories, (4) storage and transportation systems, and (5) resource management. The Office of the Director provides policy advice to the Secretary on the Civilian Radioactive Waste Management Program, and ensures that the overall direction and pace of the program proceed as required by the NWPA.

The Office of Policy and Outreach performs major staff functions related to program policy formulation, policy analysis, institutional/external relations, quality assurance and environmental standards, and international activities related to radioactive waste management.

The Office of Geologic Repositories plans, coordinates and directs the deployment of geologic repositories, including planning and scheduling, siting, repository engineering and licensing, and geoscience activities, as well as institutional interaction with the affected States and Indian tribes.

The Office of Storage and Transportation Systems manages the development of waste packaging, handling and transportation systems, interim and long-term storage facilities, including one or more potential Monitored Retrievable Storage (MRS) facilities, if authorized by Congress, and systems engineering processes.

The Office of Resource Management is responsible for Nuclear Waste Fund budget formulation and execution, accounting and auditing of resources, fee calculation and total system life cycle costing, the OCRWM Program Management System and Program Management Information System, other management information systems, the Project Decision Schedule, management of contracts with waste activities for disposal of high-level radioactive waste, and traditional support activities, including procurement, personnel, and correspondence and records management.

2. Field

OCRWM project offices at Richland, Washington; Las Vegas, Nevada; Columbus, Ohio; and Chicago, Illinois are responsible for geologic repository activities in the basalt, tuff, and salt and crystalline rock media, respectively. Among the responsibilities of OCRWM project offices are consultation and coordination with State governments, Indian tribes and the public on repository issues, preparation of environmental assessments, site investigation and characterization, and repository license application support. In addition, the Richland Operations Office and Idaho Operations Office provide support in MRS and transportation systems design and development, and rod consolidation equipment development and demonstration.

b. FY 1987 Congressional Request

A total of 292 full time equivalents (FTEs) in FY 1987 is requested for Federal positions at headquarters and in the field directly associated with the technical management of the activities related to geologic repositories, Monitored Retrievable Storage, transportation, waste systems integration, and management of the Nuclear Waste Fund. Although in creased workloads will result from implementation of the geologic repository subprogram's detailed site characterization phase, MRS proposal follow-on activities with Congress and affected parties for three sites, and field studies in crystalline rock for the siting of the second repository, no additional FTE's above the FY 1986 level are requested. This request includes employee development activities to provide incentives and training to retain qualified staff and managers for the long-term radioactive waste management effort.

The allocation of FTEs by function and location is as follows:

	FY 1986 Appropriation	FY 1987 Request	FY 1988 Estimate	FY 1989 Estimate
Program Direction (HQ)	4	4	4	4
Policy and Outreach (HQ)	18	18	18	18
Geologic Repositories				
Headquarters	48	48	48	48
Field	136	136	136	136
Storage and Transportation Systems				
Headquarters	21	21	21	21
Field	9	9	9	9
Resource Management (HQ)	36	36	36	36
Program Support (HQ)	20	20	20	20
TOTALS	292	292	292	292

FY 1988 Estimate - Program Management and Support - Total	$72,664
1. Technical Support	$52,399

In FY 1988, technical support contractor assistance will continue with emphasis on the preparation of site recommendation documentation. Efforts will also continue in long-term fuel storage monitoring. The Materials Characterization Center will continue to support integration of waste package materials testing and will focus on accumulated data from field tests during site characterization and data obtained from foreign programs. These data will be the basis for the license application as related to the waste form release rate and the metal waste container life expectancy. The large scale radioactive waste systems test would continue. These tests would add considerably to the credibility of the data base and would provide the necessary extrapolation of repository performance spanning thousands of years. Evaluation of waste package designs and test programs would continue. Performance assessment scientific support to the respository development effort would also continue incorporating site-specific design information and the development of performance codes. In addition, support will continue to be provided to the development of an Environmental Impact Statement and for defense waste studies. Supporting studies and fund management activities will continue at essentially the same levels as FY 1987 as will outreach activities, technical support for policy issues and program management, and coordination of international activities.

E. Program Management and Technical Support - FY 1988 Congressional Estimate - continued

2. Program Management... $20,265

The total staffing is estimated to be 292 FTEs in FY 1988 to manage intensified site characterization work and exploratory shaft construction management, increased interaction with interested parties in regard to first and second repository deployment, and preparation of repository and waste systems licensing documents.

FY 1989 Estimate - Program Management and Technical Support - Total... $72,192

1. Technical Support... $51,719

Technical support work will continue in FY 1989. The technical support contractor will continue to provide technical expertise in areas of systems engineering, waste package development, performance assessment, and technology tradeoff and cost analysis. Long-term fuel storage and monitoring will also continue. Efforts will continue at MCC on materials development, integration and performance in a repository environment. Performance assessment scientific support and evaluation of waste package designs will also continue as will support for development of an Environmental Impact Statement and defense waste studies. Supporting studies and fund management activities will continue at FY 1988 levels of effort as will outreach activities, technical support for policy issues and program management and international support.

2. Program Management... $20,473

The total staffing is estimated to be 292 FTEs in FY 1989. No increase is anticipated over FY 1988 levels.

F. Debt Service (Interest)

This budget item identifies the actual interest expense of the Nuclear Waste Fund. DOE repayed the appropriated debt of approximately $264,964,393 in FY 1985. This has resulted in the elimination of interest expense (debt service) after FY 1985.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
NUCLEAR WASTE FUND

Nuclear Waste Fund Construction
Nuclear Waste Fund

(Tabular dollars in thousands. Narrative material in whole dollars.)

Exploratory Shaft at Hanford, Washington
Richland Operations Office

Total Estimated Cost (TEC) $140,700,000
(For Design and Construction)

Exploratory Shaft at Hanford, Washington
Richland Operations Office

Total Estimated Cost (TEC) $140,700,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Actual			FY 1986 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction (TEC)	$20,724	$ 1,332	$ 1,332	$ 1,664	$11,946	$10,318
Management and integration:						
M&I (Non-TEC)	5,859	1,276	1,276	1,598	1,500	1,500
M&I (TEC)	2,997	2,086	2,086	2,086	2,000	2,000
Subtotal - M&I	8,856	3,362	3,362	3,684	3,500	3,500
Operations	208	216	216	200	200	200
Testing	3,481	4,295	4,295	4,131	5,070	4,000
Decommissioning	---	---	---	---	---	---
Total operating expenses	$33,269	$ 9,205	$ 9,205	$ 9,679	$20,716	$18,018
Capital equipment:						
CE (Non-TEC)	96	251	251	36	856	289
CE (TEC)	1,893	2,549	2,549	3,649	28	28
Subtotal - CE	1,989	2,800	2,800	3,685	884	317
Other DOE funding	595	---	---	---	---	---
Total Project funding	$35,853	$12,005	$12,005	$13,364	$21,600	$18,335
Total - (Non-TEC)	($10,239)	($ 6,038)	($ 6,038)	($ 5,965)	($ 7,626)	($ 5,989)
Total - (TEC)	($25,614)	($ 5,967)	($ 5,967)	($ 7,399)	($13,974)	($12,346)

Exploratory Shaft at Hanford, Washington
Richland Operations Office

Total Estimated Cost (TEC) $143,700,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1987 Estimate		FY 1988 Estimate		FY 1989 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction (TEC)	$33,978	$28,519	$30,890	$34,342	$ 6,606	$10,732
Management and integration:						
M&I (Non-TEC)	1,500	1,500	3,430	3,283	601	1,607
M&I (TEC)	2,000	2,000	7,741	7,741	4,660	4,660
Subtotal - M&I	3,500	3,500	11,171	11,024	5,261	6,267
Operations	200	200	13,270	12,502	19,127	18,675
Testing	9,151	7,712	11,770	11,998	9,273	9,452
Decommissioning	---	---	---	---	---	---
Total operating expenses	$46,829	$39,931	$67,101	$69,866	$40,267	$45,126
Capital equipment:						
CE (Non-TEC)	791	1,504	127	117	---	175
CE (TEC)	3,266	2,795	48	523	---	---
Subtotal - CE	4,057	4,299	175	640	---	175
Other DOE funding	---	---	---	---	---	---
Total Project funding	$50,886	$44,226	$67,276	$70,506	$40,267	$45,301
Total - (Non-TEC)	($11,642)	($10,916)	($28,597)	($27,900)	($29,001)	($29,909)
Total - (TEC)	($39,244)	($33,310)	($38,679)	($42,606)	($11,266)	($15,392)

Exploratory Shaft at Hanford, Washington
Richland Operations Office

Total Estimated Cost (TEC) $140,700,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1990 Estimate		FY 1991 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):					
Design and construction (TEC)	---	$ 953	---	---	$105,276[a]
Management and integration:					
M&I (Non-TEC)	$ 7,346	5,803	$ 893	$ 1,888	22,285
M&I (TEC)	6,121	6,121	35	35	27,640[a]
Subtotal - M&I	13,467	11,924	928	1,923	49,925
Operations	29,599	28,802	11,593	13,842	74,413
Testing	18,312	20,024	4,406	5,152	65,886
Decommissioning	---	---	---	---	---
Total operating expenses	$61,378	$61,703	$16,927	$20,917	$295,500
Capital equipment:					
CE (Non-TEC)	---	---	---	---	2,121
CE (TEC)	---	---	---	---	7,784[a]
Subtotal - CE	---	---	---	---	9,905
Other DOE costs	---	---	---	---	595
Total Project costs	$61,378	$61,703	$16,927	$20,917	$306,000
Total - (Non-TEC)	($55,257)	($54,629)	($16,892)	($20,882)	($165,300)
Total - (TEC)	($ 6,121)	($ 7,074)	($ 35)	($ 35)	($140,700)

[a] To reconcile with the TEC $140,700,000, add $27,640,000 of Management and Integration, and $7,784,000 of Capital Equipment to Design and Construction $105,276,000.

Exploratory Shaft at Hanford, Washington
Richland Operations Office

Total Estimated Cost (TEC) $140,700,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Exploratory Shaft (ES) facility is located at the Reference Repository Location (RRL) approximately 1 mile (1.6 kilometers) west of the boundary for the 200 West Area on the Hanford Site near Richland, Washington. The facility will consist of two six-foot inside diameter blind-drilled shafts with grouted steel liners. When completed, the two shafts will be capable of transporting personnel and materials to the proposed horizon (Cohassett). The underground drifts will allow for in situ characterization of the site. The ES site will encompass approximately 45 acres (18 hectares) of surface area enclosed within an 8-foot antipersonnel fence.

Design and construction of the ES facility is being performed in two distinct stages, ES Phase I (first shaft activities), and ES Phase II (second shaft activities).

Phase I will consist of a borehole approximately 110-inches (279 centimeters) in diameter, lined with a 6-foot (1.8 meters) ID Steel liner, capable of transporting personnel and materials to the proposed depth of approximately 3,160 feet to provide access to the reference repository horizon. Shaft breakout will verify the performance of the grout seal to safely isolate the reference horizon from the Hanford ground water systems. Sump pumps, electrical service, ventilation air, and compressed air will be provided at depth.

Phase II will be an addendum to the existing ES Phase I site and will consist of a second shaft, approximately 110-inches (279 centimeters) in diameter lined with a 6-foot (1.8 meters) ID steel liner, and expanded surface and underground workings. The shaft station will be expanded to about 1,600-feet of drifts containing service areas and test chambers. Prime factors dictating construction of the second shaft are to provide personnel working underground a second means of ingress/egress, and allow for reversible ventilation throughout the facility.

ES Phase II objective - conduct in situ testing to obtain information necessary for repository design, performance assessment, the Draft Environmental Impact Statement (DEIS), and the License Application (LA).

The in situ testing program will assess the geologic characteristics and hydrologic properties of the candidate repository horizon to aid in evaluation of the isolation capability of the RRL, and to assess geomechanical characteristics to determine if the stability of openings can be maintained throughout the operational life of the proposed repository without adversely affecting isolation capability or retrievability.

Description, Objective and Justification (Continued)

If the ES facility is not used as a component of the repository, detailed plans for normal decommissiong will include dismantling of the surface facilities and utilities, shaft sealing, and the return of the site to its natural state. All structures, i.e., mobile offices, storage facilities, electrical distribution equipment, explosive magazines, etc., will be removed for reuse or salvage. Drilling fluid, which can be reused, will be removed. The mud pits will be dried to the depth of the bentonite lining and filled. Shafts and tunnels will be backfilled from the spoil piles. The surface will be blended or tilled and the area graded to blend with adjacent contours. Reseeding may be provided. No costs have been budgeted for this element.

If the ES Project becomes a part of an operating repository, then a portion of the repository Safety Analysis Report (SAR) will be dedicated to ES decommissioning.

Capital equipment related to construction consists of shaft hoists (both main hoist and stand-by hoist) emergency generator, ventilation equipment, such as fans and compressors, cooling towers, colling water pumps, transformers and major switchgear. Capital equipment for test programs will be limited to items located at the surface since test assemblies taken underground will be subjected to an adverse environment, which will render them unusable by the conclusion of the test program.

The technical management of the ES Program is under the direction of Rockwell Hanford Operations (Rockwell) in support of the Department of Energy-Richland Operations Office (DOE-RL). Facility design, both surface and subsurface, is being performed by Raymond Kaiser Engineers, Inc./Parsons Brinckerhoff Quade & Douglas, Inc.(RKE/PB), joint venture Architect/Engineer (A/E) under contract to DOE-RL. The construction of the ES facility will be performed by Morrison-Knudsen, Co., Inc. (M-K), Construction Manager (CM), under contract to DOE-RL. Rockwell has been designated as technical manager of both the A/E and the CM. Specification, design, installation, and conduct of the test program is the responsibility of Rockwell. Results of the ES test program will be integrated into the Draft Environmental Impact Statement (DEIS) and License Application, which are documents to be prepared by Rockwell. These documents, along with results from other Basalt Waste Isolation Project (BWIP) site characterization activities, will form the basis for a seleaction of the first repository site. Specialized support for the ES Program is furnished by other Hanford site subcontractors, and other DOE-RL contractors.

Description, and Objective and Justification (Continued)

Operation of the ES Facility will be conducted on a 7-day per week, 24-hour per day basis. Upon completion of underground construction and acceptance of the facility by the operating contractor, operators on the surface will operate and maintain life support systems to support the underground test programs. The life support systems will consist of the shaft's main and emergency hoists, electrical power, compressed air, ventilation air, service water, lighting, communication systems, and emergency systems.

The Underground Test Plan defines the testing required for in situ characterization. This Test Plan is designed to fulfill the following overall ES Program objectives:

ES Phase I objective - provide access to the preferred candidate repository horizon to perform in situ testing.

The overall objectives of the ES Program are as follows: (1) to provide access to the preferred candidate repository horizon to perform in situ testing; and (2) conduct in situ testing to obtain information necessary for repository design, performance assessment, the Draft Environmental Impact Statement, and the License Application.

Surface evaluation of the Reference Repository Location in basalt does not provide data at a sufficient level of confidence necessary for site characterization. The ES Program will contribute to site characterization through extensive in situ testing. This testing will assess the geologic characteristics and characteristic variables; assess the hydrologic properties to aid in evaluation of the isolation capability of the candidate basalt horizon; and determine that the stability of openings can be maintained throughout the operational life of the proposed repository without adversely affecting isolation capability or retrievability. At the conclusion of the ES Program, and throughout the use of data obtained in other BWIP site characterization activities, data will be available to assess the suitability of the basalt on the Hanford site for use as a nuclear waste repository.

Exploratory Shaft at Hanford, Washington
Richland Operations Office

Total Estimated Cost (TEC) $140,700,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table represents the total program broken down by summary tasks:

Activity	Calendar Year Start		Calendar Year Complete	
Complete ES Phase I Conceptual Design			July	1981
Issue Phase I Test Plan			September	1981
ES Phase I Long Lead Procurement	December	1981	December	1984
ES Phase II Title II Design Report Approved and Released	February	1982	September	1983
Complete Principal Borehole Testing	January	1982	January	1983
Issue Revised Draft Exploratory Shaft Test Program	April	1982	December	1984
Second Shaft Conceptual Design	June	1984	April	1985
Complete Construction Prerequisite Readiness Review for First Shaft	October	1984	March	1987
Prepare Second Shaft Definitive Design	April	1986	June	1987
Construct First Exploratory Shaft	May	1987	November	1988
Construct Second Exploratory Shaft	April	1988	September	1989
Porthole Testing First Shaft	December	1988	April	1989
Breakout and Mine Shaft Station	April	1989	June	1989
ES Phase I Testing	April	1989	June	1989
Mine Main Drifts, Hydrology Drift, and Rock Mechanics Drift	June	1989	February	1990
Perform Exploratory Shaft In Situ Test Program	July	1989	May	1991

(b) Management and Contracting

The technical management of the ES facility design, construction, operation, and testing is under the direction of Rockwell in support of the DOE-RL. Surface and subsurface facility design is being performed by RKE/PB, a joint venture A/E under direct contract to DOE-RL. Exploratory Shaft facility construction will be performed by M-K, Construction Manager, under direct contract to DOE-RL. Test design, procurement, installation, and performance is the responsibility of Rockwell. Specialized support, such as design and construction of offsite facilities, is furnished by the Hanford A/E (Kaiser Engineering Hanford Company) and the Hanford Project Construction firm (J.A. Jones Construction Services Company) under the direction of Rockwell.

(c) Prior Year Achievements

Both the water line from 200 West to the ES Phase I site, and the electrical powerline/substation were completed and accepted for operation. Long-lead procurement for big hole drill tools, main hoist, drill pipe, 112-inch shaft liner, and 72-inch shaft liner, was completed by Rockwell. Other significant achievements include: Phase I Title II design completion; mobilization of the CM; completion of the drill pad and collar; and mobilization of the big hole drill rig. Subsequent to mobilization of the drill rig a program directive was received, in February 1983, which mandated suspension of drilling pending future authorization. The drill rig has been maintained in a secured stand-by mode pending restart.

A revised draft of the Underground Test Plan (containing upgraded objectives and tests for the ES Phase I and Phase II in situ test program) was submitted to DOE-RL for review and comment in September 1983. Subsequently, a Test Plan Workshop consisting of members of the RL-BWIP Overview Committee, the Nuclear Regulatory Commission (NRC), the U. S. Geological Survey (USGS), and other concerned parties was convened in Richland, Washington during November 1983 to solicit peer review and comments on the adequacy of the Test Plan. In conjunction with the preceding activities, the ES Phase II Functional Design Criteria (FDC) were revised to include provision for a second 6-foot diameter shaft. The FDC together with a proposed Statement of Work for A/E services were submitted to DOE-RL for approval in October 1983.

The porthole drill and associated equipment have been procured, set-up in the Near Surface Test Facility (NSTF), and porthole drilling out of a simulated 6-foot shaft, has been successfully demonstrated. A drill for drilling long, horizontal boreholes (approximately 1,000 feet) was procured, set-up at the NSTF, and drilling demonstrated successfully.

Exploratory Shaft at Hanford, Washington
Richland Operations Office

Total Estimated Cost (TEC) $[illegible]

(Tabular dollars in thousands. Narrative material in whole dollars)

(d) Current Year Achievements:

Complete construction and installation of the underground utilities to all office trailers. Complete Phase I procurement of 72-inch (1.8 meters) diameter liner sections. Maintain drill rig in secured standby mode. This update reflects a delay in start of deep hole drilling to May, 1987 and breakout at the Cohassett Flow Horizon.

Complete conceptual design for the Phase II facility. Initiate definitive design changes as required on Phase II liners, starter hole, and drill pad and collar design packages to support start of construction in 1986. Resolution of all comments resulting from the November 1983 Test Plan Workshop, and release of the Underground Test Plan in December 1985. Continue test design and preparation of test procedures for the ES Phase II in situ test program.

(e) Reasons for Increases and Decreases

The current year budget, dated January 1985, identified a Total Estimated Cost (TEC) of $[illegible]. The decrease in the TEC shown in this submission is due mainly to the better definition of the Exploratory Shaft design and its associated cost estimate. It also reflects the current schedule for in start of drilling; drill rig buy out costs; increased emphasis on construction and pre-operational readiness reviews; and escalation.

Exploratory Shaft at Hanford, Washington
Richland Operations Office

Total Estimated Cost (TEC) $140,700,000

[Tabular dollars in thousands. Narrative material in whole dollars.]

(f) Cost Estimate

Design and construction costs are based on a planned start-of-drilling by May 1986 for Phase I, and April 1988 for Phase II. The estimate includes costs for the purchase of the drill rig, service agreement for the maintenance of the rig, by a major drilling sub-contractor and stand-by mode costs.

The ES Total Estimated Cost is based upon actuals incurred through fiscal year 1985, and estimated costs from fiscal year 1986 through fiscal year 1991. Construction costs estimates are based on definitive design for Phase I and conceptual design for Phase II.

	Item Cost	Total Cost
1. Engineering, design and inspection		$ 8,631
2. Construction costs		111,975
(a) Site Preparation	$ 1,725	
(b) Surface Facilities	4,105	
(c) First Shaft	37,462	
(d) Second Shaft	22,294	
(e) Subsurface Excavations	7,930	
(f) Underground Service Systems	13,640	
(g) Construction Management	24,819	
Subtotal		120,606
3. Contingency		20,094
Total Estimated Cost		$140,700

An overall contingency rate of approximately 17 percent is a result of application of contingency rates appropriate to each remaining work element.

Escalation rates are applied to all fiscal years in accordance with Department of Energy validated indices for the Richland Operations Office area.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
NUCLEAR WASTE FUND

Nuclear Waste Fund Construction
Nuclear Waste Fund

(Tabular dollars in thousands. Narrative material in whole dollars.)

Exploratory Shaft at Yucca Mountain, NTS
Nevada Operations Office

Total Estimated Cost (TEC) $34,711,000
(For Design and Construction)

Exploratory Shaft at Yucca Mountain, NTS
Nevada Operations Office

Total Estimated Cost (TEC) $34,711,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 Actual			FY 1986 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction (TEC)......................	$ 4,717	$ 829	$ 829	$ 829	$ 872	$ 872
Management and integration:						
M&I (Non-TEC)..................................	3,114	1,074	1,074	1,074	3,036	3,036
M&I (TEC)......................................	---	---	---	---	147	147
Subtotal - M&I.................................	$ 3,114	1,074	1,074	1,074	3,183	3,183
Operations.......................................	462	---	---	---	---	---
Testing..	1,370	4,808	4,808	4,716	8,036	8,099
Decommissioning..................................	---	---	---	---	---	---
Total operating expenses.........................	$ 9,663	$6,711	$6,711	$6,619	$12,091	$12,154
Capital equipment................................	6,345	1,785	1,785	1,350	1,789	2,019
Other DOE funding................................	---	---	---	---	---	---
Total Project funding............................	$16,008	$8,496	$8,496	$7,969	$13,880	$14,173
Total - (Non-TEC)................................	($11,291)	($7,667)	($7,667)	($7,140)	($12,861)	($13,154)
Total - (TEC)....................................	($ 4,717)	($ 829)	($ 829)	($ 829)	($ 1,019)	($ 1,019)

Exploratory Shaft in Yucca Mountain, NTS
Nevada Operations Office

Total Estimated Cost (TEC) $ 34,711,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1987 Estimate		FY 1988 Estimate		FY 1989 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction (TEC)	$14,329	$12,941	$11,210	$12,598	---	---
Management and integration:						
M&I (Non-TEC)	2,841	2,841	2,937	2,937	3,523	3,523
M&I (TEC)	925	925	1,682	1,682	---	---
Subtotal - M&I	3,766	3,766	4,619	4,619	3,523	3,523
Operations	2,823	2,823	6,009	6,009	3,873	3,873
Testing	17,437	14,912	24,473	24,473	21,974	21,974
Decommissioning	---	---	---	---	---	---
Total operating expenses	$38,355	$34,442	$46,311	$47,699	$29,370	$29,370
Capital equipment	2,737	3,552	1,261	1,261	453	453
Other DOE funding	---	---	---	---	---	---
Total Project funding	$41,092	$37,994	$47,572	$48,960	$29,823	$29,823
Total - (Non-TEC)	($25,838)	($24,128)	($34,680)	($34,680)	($29,823)	($29,823)
Total - (TEC)	($15,254)	($13,866)	($12,892)	($14,280)	(---)	(---)

Exploratory Shaft at Yucca Mountain, NTS
Nevada Operations Office

Total Estimated Cost (TEC) $34,711,000(a)

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1990 Estimate		FY 1991 Estimate		Total Cost
	B/A	B/O	B/A	B/O	B/A
Operating expenses (DOE):					
Design and construction (TEC)	—	---	---	---	$ 31,957(a)
Management and integration:					
M&I (Non-TEC)	$1,760	$ 1,760	$1,703	$1,703	19,988
M&I (TEC)	---	---	---	---	2,754(a)
Subtotal - M&I	1,760	1,760	1,703	1,703	22,742
Operations	2,072	2,072	994	994	16,233
Testing	18,350	20,875	4,627	4,656	101,075
Decommissioning	----	----	----	---	---
Total operating expenses	$22,182	$24,707	$7,324	$7,353	$172,007
Capital equipment	271	271	142	1,842	14,783
Other DOE costs	----	----	----	----	------
Total Project costs	$22,453	$24,978	$7,466	$9,195	$186,790
Total - (Non-TEC)	($22,453)	($24,978)	($7,466)	($9,195)	($152,079)
Total - (TEC)	(---)	(---)	(---)	(---)	($ 34,711)

(a) To reconcile with the TEC of $34,711,000, add $2,754,000 of Management and Integration to Design and Construction $31,957,000.

Exploratory Shaft at Yucca Mountain, NTS
Nevada Operations Office

Total Estimated Cost (TEC) $34,711,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

This project will provide a 1,480-foot deep, 12-foot finished, inside diameter, concrete-lined, vertical shaft and a 1,200-foot deep, 6-foot inside diameter, vertical shaft with associated surface facilities, subsurface lateral excavations, and subsurface lateral borings. A wide range of geologic, geochemical, geomechanical, hydrologic and thermal testing, and data acquisition activities to be conducted in the shaft complex are included in the project. A description of the project in terms of major elements of engineering and construction activities are provided below:

Improve 7 miles of dirt road to include grading and widening to 22 feet and applying a double oil and chip surface treatment; construct about 6 miles of 69 kV overhead electrical power transmission line and about 6 miles of 6-inch diameter underground water line, including two 120 horsepower (hp) booster pumping stations.

Grade and stabilize an approximate 5-acre contiguous site surface areas to include drainage provisions and access control fencing.

Install a 5,000 kVA electrical substation with one 69 kV/4160V primary transformer, switchgear and circuit breakers, and 4160/480/240V secondary transformers and distribution systems; provide a 1,000 kVA emergency electrical generator system; and install a 100,000-gallon water storage-distribution system at the shaft site.

Construct concrete building foundations, trailer pads and mine plant equipment pads, and erect four pre-engineered metal buildings (60-by 50-foot hoist house, 20 by 20 emergency hoist house, 40- by 30-foot warehouse and 40- by 30-foot shop); set and connect 12 60- by 12-foot trailers; install one 900 hp and one 400 hp mine hoist, and one 100 hp emergency mine hoist, two 100 hp ventilation fans and two 1,500 cfm air compressors. Total project costs include funds for capital equipment purchases necessary for the operation of tests and for the facility design and construction that will require such items as hoists, generators, compressors, transformer, etc.

Construct a 12-foot finished, inside diameter by 40-foot deep reinforced shaft collar including reinforced concrete headframe foundation and install dual sheave 80-foot high mine headframe; construct a 14-foot diameter 1,480-foot deep shaft by conventional mining techniques, lined with unreinforced concrete to a finished inside diameter of 12 feet; and fitted with horizontal steel sets on a 10-foot spacing, personnel ladderway, conveyance guides, communication cable, electrical conduit, water and compressed air lines; install permanent shaft conveyances to include a double deck personnel cage and bottom dump muck skip; and install a mine dewatering system.

Total Estimated Cost (TEC) $86,711,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification (Continued)

Drill a 12-1/4-inch diameter vertical pilot hole from the surface to a depth of 1,250 feet to intersect a lateral drift which extends approximately 200 feet from the centerline of the 12-foot diameter shaft. Raise bore a [illegible] to 6-foot diameter shaft through the pilot hole and install a 6-foot inside diameter liner. Install a temporary headframe and emergency personnel hoisting system at the collar of the 6-foot finished diameter raise bored shaft.

Excavate and provide ground support for underground openings in the main test level (1,050-foot depth), upper test level (520-foot depth), and shaft bottom (1,000-foot depth) equivalent to about 1,000 lineal feet of 15- by 15-foot tunnel. Provide miscellaneous excavations and borings necessary for the installation of the in situ test hardware.

Management and integration activities consist of project planning and scheduling, budgeting, technical direction and control. Review, integrate, and approve engineering designs to assure compatibility with project technical requirements. Develop and implement project safety and quality assurance plans and procedures. Provide project support from the architect-engineer and the construction manager as required.

The operating contractor will provide metered electric power, communications, fire/radiological safety, etc. operating personnel to sustain the day-to-day operation of the Exploratory Shaft Facility (ESF) and to maintain underground access for user personnel. Provide inspection and maintenance services for all ESF equipment, facilities and systems. Provide labor for direct support of underground testing program. Provide safety training and certification for personnel responsible for operational control of underground access.

Testing activities will include geologic and hydrologic observations and geologic, hydrologic, geomechanical, thermal and mechanical tests. Acquire, store and analyze test data by means of the integrated data acquisition and control system (IDS). Prepare technical reports to be used in determining the suitability of the Yucca Mountain site for the construction of a high-level nuclear waste repository.

If the site is determined to be unsuitable for a repository, plans for decommissioning the ESF will be developed and implemented in accordance with the requirements contained in the NWPA. Presently, no specific criteria has been developed to estimate cost for decommissioning planning and implementation, therefore, no costs are included in the total project costs for this element.

Exploratory Shaft at Yucca Mountain, NTS
Nevada Operations Office

Total Estimated Cost (TEC) $34,711,000

[Tabular dollars in thousands. Narrative material in whole dollars.]

Description, Objective and Justification (Continued)

The primary objective of this project is to obtain and analyze in situ geotechnical data to be used in determining the suitability of the Yucca Mountain site for the construction of a high-level radioactive waste repository. Functional requirements of the design, construction, and operations phases which support the primary objective are to (1) provide access to selected underground tuff horizons and surrounding strata in an unsaturated zone at the Yucca Mountain site, and (2) provide the ability to safely and effectively acquire the necessary data for testing.

The NWPA requires that the DOE conduct site characterization activities at candidate repository sites to evaluate the suitability of such sites for the construction of a high-level radioactive waste repository. The Yucca Mountain site is among three potentially acceptable candidate sites which are scheduled to be approved to proceed with the exploratory shaft construction phase of site characterization.

Exploratory Shaft at Yucca Mountain, NTS
Nevada Operations Office

Total Estimated Cost (TEC) $34,111,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

The following table presents the total program broken down by primary tasks:

Activity	Calendar Year			
	Start		Complete	
Conceptual Design[a]	April	1981	June	1982
Test Plan Development	February	1982	March	1986
Title I Engineering[a]	October	1982	January	1983
Road and Utilities Extensions[a]	July	1982	May	1983
Title II Engineering[a]	December	1982	September	1983
Long-lead Procurement[a]	February	1983	February	1984
Design and Specification (IDS)	January	1984	May	1985
Design Summary Document	July	1984	April	1985
Design for Raise Bore Shaft	July	1984	June	1985
Shaft Contractor Procurement	December	1985	July	1986
Site Preparation	December	1986	May	1987
Shaft Sinking (12-foot diameter)	May	1987	September	1988
ESF Testing	May	1987	May	1991
Underground Mining	October	1988	January	1989
Raise Bore 6-foot Diameter Shaft	September	1988	April	1989
Lateral Core Hole Drilling	December	1988	July	1989

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[a] Activity Completed (For Single Shaft Concept)

(b) Management and Contracting

This project is managed by the DOE Nevada Operations Office (NV) through its Waste Management Project Office (WMPO). The Director, WMPO, is the Project Manager for the Exploratory Shaft project. The Project Manager receives project specific technical planning and direction assistance from the ES Conceptual Design Report, the ES Functional Design Criteria, and the Underground Test Plan. A Project Management Plan, NVO-255, dated August 1983, has been developed in accordance with DOE Order 5700.4 to provide the basic guidance and describe the organizational structure and procedures for the conduct of the ES project.

The Nevada Operations Office NV the procurement agent responsible for acquiring the necessary services to accomplish the design, construction, and testing for the ES. The basic procurement strategy for the ES design and construction phases is to utilize three existing NV operating contracts with major subcontracts for services, materials, and equipment to be competitively awarded. The current plan is to accomplish the construction of the two shafts and horizontal drifts through a fixed price contract awarded to and managed by REECO. The budget authority in FY 1987 is sufficient to authorize work on construction of the first shaft. The budget authority for construction of the second shaft and horizontal drifts is provided in FY 1988. The three existing NV contracts are cost-plus-award-fee contracts identified as follows:

(1) Contract No. DE-AC08-84NV10322, Fenix and Scission, Inc. (F&S), Architect-Engineer for drilling and mining.
(2) Contract No. DE-AC08-76NV00020, Holmes & Narver, Inc. (H&N), Architect-Engineer for surface facilities.
(3) Contract No. DE-AC08-84NV10327, Reynolds Electrical and Engineering Co., Inc. (REECO), Operating Support and Construction Contractor.

In addition to the technical planning and direction provided by the University of California (LANL), scientific services of the Lawrence Livermore and Sandia National Laboratories and the U.S. Geological Survey are provided for testing and data analyses. Technical and management support is provided by Science Applications, Inc., under Contract No. DE-AC08-83NV10270.

Total Estimates Cost (TEC) $34,711,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(c) Prior Year Achievements

All long-lead construction-related equipment were received. A conceptual design report for the Integrated Data Acquisition System (IDS) was completed. Revision of Title II drawings to incorporate the second shaft have been completed. An NRC/DOE exploratory shaft design and construction workshop was conducted.

(d) Current Year Achievements

The Exploratory Shaft Test Plan (ESTP) draft will be completed and delivered to DOE for review and revision prior to submittal to the Nuclear Regulatory Comission. An NRC/DOE workshop on the ESTP will be conducted. The shaft construction subcontract will be awarded. Field and laboratory test activities related to test execution planning and test equipment design will continue.

(e) Reasons for Increases and Decreases

The current year budget, dated January 1985, identified a Total Estimated Cost (TEC) of $44,741,000 in Year Of Expenditure (YOE) dollars. The decrease in the TEC shown in this submission is due mainly to the redefining of the work breakdown structure. Test support costs expected to be incurred during construction were formerly allocated to construction WBS elements. These costs are now allocated to the testing WBS element.

The current year budget (FY 1986) identified a total project cost in year-of-expenditure dollars of $164,000,000 comprised of $154,000,000 in operating expenses and $10,000,000 in capital equipment. The reason for the increase from $164,000,000 to $187,000,000 is due mainly to redefining the work breakdown structure which center a more realistic basis to develop estimates for management and integration, testing, and capital equipment requirements. The $23,000,000 increase is comprised of $18,000,000 of operating costs and $5,000,000 of capital equipment costs.

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimate

The cost estimate has been developed based upon the current baseline work breakdown structure (WBS) for the Exploratory Shaft. Level 2 WBS elements are shown below.

	Item Cost	Total Cost
1. Engineering, design, and inspection		$ 3,715
2. Construction costs		27,722
(a) Site preparation	$ 6,185	
(b) Surface Facilities	637	
(c) First Shaft	10,480	
(d) Second Shaft	1,459	
(e) Subsurface Excavations	2,750	
(f) Underground Service Systems	3,457	
(g) Construction Management	2,754	
Subtotal		31,437
3. Contingency		3,274
Total Estimated Cost		$34,711

The figures include contingency ranges from 10 percent to 25 percent applied to level 2 WBS elements consistent with the uncertainties associated with defining and controlling each level 2 WBS element. The primary sources of the basic cost figures are: 1) engineering estimates of February 1985 for surface and subsurface facilities based upon revised design;

Exploratory Shaft at Yucca Mountain, NTS
Nevada Operations Office

Total Estimated Cost (TEC) $36,711,000

[Tabular dollars in thousands. Narrative material in whole dollars.]

(f) Cost Estimate (Continued)

2) operating contractor estimates of February 1985 for maintenance and operations; 3) principal investigator's estimates of March 1985 for the preparation of final technical reports associated with the Exploratory Shaft project through the second quarter of FY 1991; and 4) conceptual design estimates of February 1985 for the Integrated Data System (IDS).

Escalation rates are applied to all fiscal years in accordance with indices established for construction projects by the Department of Energy.

Exploratory Shaft in Salt
Chicago Operations Office

Total Estimated Cost (TEC) $177,218,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Year	FY 1985 Actual			FY 1986 Estimate	
	Obs.	B/A	Obs.	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction (TEC)	$ 4,801	$ 603	$ 603	$ 1,621	$ 2,656	$ 4,163
D&C Second Half of Liner	---	---	---	---	---	---
Subtotal - D&C	4,801	603	603	1,621	2,656	4,163
Management and Integration:						
M&I (Non-TEC)	4,513	681	681	918	933	936
M&I (TEC)	5,367	646	646	3,624	6,437	5,087
Subtotal - M&I	9,880	1,327	1,327	4,542	7,370	6,023
Operations	---	104	104	---	728	763
Testing	2,169	917	917	1,343	3,145	2,885
Decommissioning	---	---	---	---	---	---
Total Operating Expenses	16,850	2,951	2,951	7,506	13,899	13,834
Capital equipment:						
CE (Non-TEC)	---	---	---	---	---	---
CE (TEC)	---	---	---	---	---	---
Subtotal - CE	---	---	---	---	---	---
Other DOE funding	---	---	---	---	---	---
Total Project funding	$16,850	$2,951	$2,951	$7,506	$13,899	$13,834
Total - (Non-TEC)	($ 6,682)	($1,702)	($1,702)	($2,261)	($4,806)	($4,584)
Total - (TEC)	($10,168)	($1,249)	($1,249)	($5,245)	($9,093)	($9,250)

Exploratory Shaft in Salt
Chicago Operations Office

Total Estimated Cost (TEC) $177,218,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1987 Estimate		FY 1988 Estimate		FY 1989 Estimate	
	B/A	B/O	B/A	B/O	B/A	B/O
Operating expenses (DOE):						
Design and construction (TEC)	$20,598	$18,793	$56,080	$45,838	$22,159	$36,056
D&C Second Half of Liner	---	---	---	---	23,521	23,521
Subtotal - D&C	$20,598	$18,793	56,080	45,838	45,680	59,577
Management and integration:						
M&I (Non-TEC)	861	911	495	490	498	494
M&I (TEC)	5,217	4,930	6,634	6,399	3,832	4,868
Subtotal - M&I	6,078	5,841	7,129	6,889	4,330	5,362
Operations	555	548	584	575	5,066	2,707
Testing	6,303	5,513	11,610	10,893	15,576	16,004
Decommissioning	---	---	---	---	---	---
Total operating expenses	$33,534	$30,695	$75,403	$64,195	$70,652	$83,650
Capital equipment:						
CE (Non-TEC)	1,397	800	268	597	---	268
CE (TEC)	6,585	5,155	259	1,689	146	146
Subtotal - CE	7,982	5,955	527	2,286	146	414
Other DOE funding	---	---	---	---	---	---
Total Project funding	$41,516	$36,650	$75,930	$66,481	$70,798	$84,064
Total - (Non-TEC)	($ 9,116)	($ 7,772)	($12,957)	($12,555)	($21,140)	($19,473)
Total - (TEC)	($32,400)	($28,878)	($62,973)	($53,926)	($49,658)	($64,591)

Exploratory Shaft in Salt
Chicago Operations Office

Total Estimated Cost (TEC) $177,218,000[a]

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1990 Estimate		FY 1991 Estimate		Total Costs
	B/A	B/O	B/A	B/O	
Operating expenses (DOE):					
Design and construction (TEC)	$ 9,332	$ 9,758	---	---	116,229[a]
D&C Second Half of Liner	---	---	---	---	23,521[b]
Subtotal - D&C	9,332	9,758	---	--	139,750(a)
Management and integration:					
M&I (Non-TEC)	619	614	$ 605	$ 683	9,205
M&I (TEC)	2,127	2,201	218	249	30,478[a]
Subtotal - M&I	2,746	2,815	823	932	39,683
Operations	13,562	12,833	9,349	12,522	29,948
Testing	14,269	14,764	11,344	12,618	65,333
Decommissioning	---	---	---	---	----
Total operating expenses	$39,909	$40,170	$21,516	$26,072	$274,714
Capital equipment:					
CE (Non-TEC)	---	---	---	---	1,665
CE (TEC)	---	---	---	---	6,990[a]
Subtotal - CE	---	---	---	---	8,655
Other DOE costs	---	---	---	---	----
Total Project costs	$39,909	$40,170	$21,516	$26,072	$283,369
Total - (Non-TEC)	($28,450)	($28,211)	($21,298)	($25,823)	($106,151)
Total - (TEC)	($11,459)	($11,959)	($ 218)	($ 249)	($177,218)

[a] To reconcile with the TEC $177,218,000, add $30,478,000 of Management and Integration, and $6,990,000 of Capital Equipment to Design and Construction $139,750,000.

[b] Costs for the second half of the liners includes the associated CM and Title III costs.

Exploratory Shaft in Salt
Chicago Operations Office

Total Estimated Cost (TEC) $177,218,000

Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

All engineering and construction activities related to site preparation, surface buildings, shaft sinking, subsurface excavation, and underground service systems are covered by this task. The surface facilities will occupy approximately 50 acres plus transportation and utility access. Two shafts will be sunk using conventional drill and blast techniques and will be finished to a 12-foot diameter and be to a depth ranging from 2,100 to 3,300 feet depending on the basin selected.

When completed, the ESF in salt will consist of the two shafts and supporting surface facilities including headframes, hoist houses, offices, warehouse, and a dry building. The prime factors dictating construction of the second shaft are ventilation and ingress/egress underground. To be in full compliance with Mine Safety and Health Administration (MSHA) regulations and DOE Order 5480.1A a second shaft is required for gassy mine conditions (30 CFR 57) and two means of ingress and egress from the underground. Shaft hoisting facilities will be designed to meet the requirements of the program.

Designing, constructing, and operating the ESF include organizational activities of DOE, the Office of Nuclear Waste Isolation (ONWI), and the following three participants: an architect/engineer (A/E) to design the facility; a construction manager (CM) to manage the construction activities; and an operations contractor (presently included in the CM contract) to operate the facility. Operational services will be provided to the DOE (SRPO) by the CM as necessary. These services include electric power, communications, ventilation, lighting and emergency systems. The A/E has developed preliminary designs for two 12-foot shafts. Final design and Title III activities will follow. The CM is contractually and technically responsible to DOE. ONWI will provide DOE with technical integration support services for the CM's effort. Scope of the CM operations will include providing personnel for the operations, maintenance, and security of the ESF and other services defined by SRPO.

The maximum subsurface area available for underground testing through using two 12-foot diameter shafts depends on the underground in situ temperature and the temperature of incoming air both of which vary widely among sites. In any event, the subsurface area will have a minimum of 5,000 linear feet of openings. This will provide for limited flexibility to accommodate changes in the in situ test program. Key testing activities consist of preparing and finalizing a site-specific Underground Test Plan, completing specifications to procure and install a data acquisition system, preparing and finalizing the shaft instrumentation plan to be implemented during shaft excavation, and preparing detailed test plans for performing tests from the ESF.

Description, Objective and Justification (Continued)

If the site is determined to be unsuitable for a repository the ESF will be decommissioned in accordance with the requirements of Public Law 97-425. No costs have been budgeted for this element.

The objective of the Exploratory Shaft Facility is to provide access to a selected salt horizon for detailed in situ characterization to acquire data necessary to support a license application to the Nuclear Regulatory Commission (NRC) for construction and operation of a nuclear waste repository, including:

- Verification of the repository design parameters. This includes the constitutive relationship, heat transfer characteristics, thermal loading response, and rheological behavior of salt.
- Evaluation of the isotropy and homogeneity of the salt at the repository horizon.
- Demonstration of the constructability and confirmation of the design to gain access to the repository horizon.
- Demonstration that the stability of openings can be maintained throughout the operational life of the proposed repository without adversely affecting isolation capability or retrievability.

Exploratory Shaft in Salt
Chicago Operations Office

Total Estimated Cost (TEC) $177,218,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Public Law 97-425 requires that the DOE conduct site characterization activities including construction of the ESF followed by at depth testing, at candidate repository sites to evaluate the suitability of such sites for the construction of a high-level radioactive waste repository.

(a) Schedule of Planned Activities

Major exploratory shaft program activities are:

	Calendar Year	
Activity	Start	Complete
Preliminary Design	December 1984	January 1986
Detailed Design	April 1986	June 1987
Long Lead Procurement	July 1986	TBD
Construction:		
Site Preparation	June 1987	TBD
Surface Facilities Construction	July 1987	TBD
Support Systems and Operating Support	July 1987	September 1990
First Shaft Construction	November 1987	May 1989
Second Shaft Construction	November 1987	May 1989
Subsurface Facilities	May 1989	November 1989
Startup/Operations:		
Site Suitability Testing	August 1989	November 1990

(b) Management and Contracting

Plans to successfully design, construct, and operate the ESF include organizational activities of DOE, the Office of Nuclear Waste Isolation (ONWI), and the following three participants: an architect/engineer (A/E) to design the facility; a construction manager (CM) to manage the construction activities; and an operations contractor (presently included in the CM contract) to operate the facility. The A/E will develop preliminary designs for two 12-foot shafts, develop final designs, provide Title III services, and prepare a set of final as-built drawings. The CM is contractually and technically responsible to DOE. ONWI will provide DOE with technical integration support services for the CM's effort. Scope of the CM operations will include providing personnel for the operations, maintenance, and security of the ESF. The current plan is to accomplish the mining of the two shafts and horizontal drifts through a fixed-price contract awarded to and managed by the CM. The budget authority in FY 1987 is sufficient to authorize work on the first phase of this mining contract, which involves preparation of the site and installation of the shaft collar down to the 100-foot level. The budget authority for the remaining phases of the work under the mining contract is provided in FY 1988, FY 1989 and FY 1990.

(c) Prior Year Achievements

Contracts were awarded to the A/E, and the integrating contractor. They and their subcontractors are organized to proceed with the critical activities to support the ESF construction start. A preliminary design for one drill shaft was completed.

The necessary support in the development of the Environmental Assessments for seven candidate sites was provided. A comprehensive study on a ESF two shaft facility and recommended shaft diameters was prepared for DOE headquarters. A comprehensive permitting strategy was developed, and a variety of technical support activities were also performed.

Total Estimated Cost (TEC) $177,218,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(d) Current Year Achievements

Complete final revisions of the two shaft preliminary designs for the three candidate sites along with an A/E cost estimate and preliminary design reports. The final design on the site recommended to the President will begin. Permitting and statutory compliance activities on the recommended site will begin, and procurement of ESF hoists will be initiated.

Support will be provided for the preparation of the site characterization plan, and underground testing plans will continue to be developed.

(e) Reasons for Increases or Decreases

The current year budget, dated January 1985, identified a Total Estimated Cost (TEC) of $210,255,000. The decrease in the TEC shown in this submission is due mainly to the better definition of the Exploratory Shaft design and its associated cost estimate. It also reflects the current schedule for start of construction; revision of cost estimates to better reflect the current project strategy; the identification and modification to the scope for operations during construction. Additionally, the impact of criteria changes from the Title I design review process were projected and included. Other adjustments were made in accordance with the guidance provided in "the definition and treatment of engineering, design, and inspection costs" prepared by the Engineering Design and Inspection Steering Committee of DOE, dated August 23, 1985.

Exploratory Shaft in Salt
Chicago Operations Office

Total Estimated Cost (TEC) $177,218,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimate

	Item Cost	Total Cost
1. Engineering, design and inspection		$ 14,252
2. Construction costs		129,602
(a) Site preparation	$ 7,171	
(b) Surface facilities	1,713	
(c) First shaft	30,535	
(d) Second shaft	32,083	
(e) Subsurface excavation	6,887	
(f) Construction management	24,154	
(g) Capital equipment	6,990	
(h) Operations	20,069	
Subtotal		143,854
3. Contingency		33,364[a]
(a) Contingency on construction costs	9,843	
(b) Second half of liner	23,521	
Total Estimated Cost		$177,218

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[a] Contingency is estimated at approximately 10 percent of construction plus capital equipment costs, and costs for the second half of the liner and associated CM and Title III costs. Escalation rates are applied to all fiscal years in accordance with indices established for construction projects by the Department of Energy.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS

Nuclear Waste Fund - Plant and Capital Equipment
Nuclear Waste Fund
Office of Civilian Radioactive Waste Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

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3. Date A-E work initiated: 2nd Quarter FY 1987

3a. Date physical construction starts: 3rd Quarter 1991

4. Date construction ends: 2nd Quarter 1996

5. Previous cost estimate: None.

6. Current cost estimate: \$1,104,200[a]
Less amount for PE&D: --

Net cost estimate: \$1,104,200[a]
Date: 9/85

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7. Financial Schedule:

Fiscal Year	Authorization	Appropriation	Obligations	Costs
1987	\$ 7,200	\$ 7,200	\$ 7,200	\$ 2,200
1988	22,600	22,600	22,600	19,900
1989	29,800	29,800	29,800	30,900
1990	32,700	32,700	32,700	26,200
1991	91,200	91,200	91,200	52,100
1992	224,000	224,000	224,000	208,400
1993	275,500	275,500	275,500	271,200
1994	264,700	264,700	264,700	288,300
1995	148,300	148,300	148,300	194,100
1996	8,200	8,200	8,200	10,900

(a) Includes escalation at the rates given in the attached Table A.1, Appendix A.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

8. Brief Physical Description of Project:

The Monitored Retrievable Storage (MRS) facility will be designed to include all facilities and equipment to receive, unload, disassemble and consolidate, canister and ship to a geologic repository or to temporarily store onsite for subsequent shipment to a geologic repository, commercial spent fuel from nuclear reactors. The facility will be designed to receive and handle 3,000 metric tons of uranium (MTU) per year as spent fuel. It will also be designed to store and ship the hardware resulting from consolidation of the spent fuel assemblies and other radioactive materials from operation of the facility. An in-building lag storage capacity for 1,000 MTU of spent fuel in canisters is provided. An outdoor storage capacity of up to 15,000 MTU of spent fuel will be provided. Total possession limit of spent fuel on the site at any one time is 15,000 MTU.

The MRS facility, being an independent installation, will require facilities to support the spent-fuel processing and storage operations. These include administrative, maintenance, warehousing, security, fire-protection, and standby power generation facilities.

Improvements to Land

Improvements to land will include paved access roads and staff parking lots, railroad spur lines, service areas, and sidewalks. All portions of the site disturbed by construction will be stabilized to prevent soil erosion. Modest landscaping will include energy-conserving, low maintenance plantings.

Buildings

o Receiving and Handling (R&H) Building

The R&H building is the primary operating building of the MRS facility. It will be designed to physically contain and control all radioactive materials received and processed or generated by the spent-fuel process operations. The building includes spaces and equipment for receiving, identifying, disassembling, consolidating, and packaging of spent fuel and processing and packaging of spent-fuel hardware for onsite storage or retrieving from storage and shipping offsite for disposal. The building will contain a lag storage vault for 1,000 MTU of consolidated spent-fuel in canisters.

Designated areas of the R&H building are used for: administration, receiving and inspection, remote handling, including spent-fuel consolidation and packaging (hot cells), 1,000 MTU lag storage, transfer/discharge, radwaste processing, and building services.

The administration area contains offices for management, staff, and operations functions; changerooms; and serves as the control point for personnel entry into the R&H building.

1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

8. Brief Physical Description of Project: (continued)

Two identical receiving and inspection areas are provided to serve the process cells and offsite shipping functions. Each receiving and inspection area includes an incoming air-control vestibule that includes vehicle washdown capabilities, a cask receiving and inspection area, and a vehicle exit air-control vestibule. Each is sized for two rail/truck lanes and contains a 150-ton-capacity bridge crane for shipping cask unloading and loading. The receiving and inspection areas are fully equipped to routinely receive and process casks of spent fuel. The equipment in these areas is designed to wash road grime from railcars or trucks and protective covers of shipping casks; and to prepare casks for unloading from railcars or trucks onto cask transfer carts. Shipping casks enter and exit the shipping loadout rooms from the receiving and inspection area on electrically powered cask carts traveling on rails.

The remote handling area includes cask handling and decontamination rooms, cask unloading rooms, spent-fuel shielded process cells, lag storage compartments, spent-fuel cask loadout rooms, shipping loadout rooms, and maintenance cells for cell equipment and cell cranes. The remote handling areas are fully equipped to routinely receive and process casks of spent fuel. The equipment in these areas is designed to perform inspection, identification, disassembly, consolidation, and canistering of spent fuel; to compact nonfuel-bearing components generated by the disassembly of spent fuel; and to perform remote maintenance and contact-handled maintenance of equipment. For personnel access to the shielded hot cells, air-control vestibules and health physics storage rooms with keyed doors are provided. Operating galleries around the shielded process cells provide operators with visual control of process operations, and allow use of master/slave manipulators, wall-mounted traveling electromechanical manipulators, and operating consoles for control to remote cell operations.

In the transfer/discharge areas, crawler-type transporters enter and exit the R&H building with the sealed storage cask.

The radwaste process areas are designed to contain the equipment used to treat, for recycling or storage, radioactive liquid and solid waste generated onsite as a consequence of processing spent fuels. Radioactive waste treatment capabilities include volume reduction, solidification, and storage of radioactive wastes generated at the MRS facility. Separate treatment systems are provided for low-level waste (LLW) and/or LLW/contact handled Transuranic (CHTRU) wastes and high-activity waste (HAW) and/or HAW/RHTRU wastes. The LLW wastes are stored temporarily onsite and shipped to an offsite LLW disposal facility. The CHTRU, HAW, and HAW/RHTRU are stored onsite and will be shipped offsite to a selected NRC licensed facility.

The building service areas contain such functions as the analytical laboratory, control room, health physics facility, laundry room, manipulator maintenance and storage, and mechanical and electrical equipment spaces. The analytical laboratory is designed to contain equipment, chemical materials, and supplies necessary for the analyses of radioactivity of samples of the solids, liquids, and gases taken from the various locations or processes in the MRS facility.

1. Title and location of project: Monitored retrievable storage facility
Clinch River Site, Tennessee
2. Project No.: 87-W-101

8. Brief Physical Description of Project: (continued)

The control room is designed to contain control consoles and CCTV monitors for supervisory control and monitoring of operations in the process cells; for monitoring and control of HVAC, utilities, and radwaste systems; and for monitoring of radioactive airborne particulates. A redundant system is located in the Site Services building control room (one of the support facilities) as a backup in case of failure or sabotage of the control room equipment in the R&H building.

A health physics facility is included for the purpose of monitoring personnel for radioactive contamination and for decontamination when necessary.

Building services area spaces are also provided for air supply and exhaust equipment, air-filtration systems, comfort heating and cooling equipment, uninterruptible power supply (UPS) and electrical equipment, laundry equipment, manipulator storage and maintenance, telephone equipment, and storage.

Systems that support the various operations in the R&H building have been provided and include decontamination solution preparation and distribution, radwaste drain system, washdown water system, steam generation system, welding station cleaning and testing system, deionized water system, vacuum air sampling system, water softener system, and laundry and dry cleaning system for contaminated clothing.

Electrical power service, distribution, grounding, lighting, communications, and alarm systems have been provided for the R&H building.

Building electrical power is obtained from normal primary feeder configuration systems. For each substation, either normal substation, either normal feeder is rated to carry 100% of the substation load. If failure of one of the primary feeders occurs, power is switched to the second feeder automatically with minimum delay in transfer time. If simultaneous failure of both normal primary feeders occurs, power is provided by four primary feeders from the standby generator system. Standby power is provided to the UPS battery chargers, selective lighting, and other critical operation systems. The standby power system is provided to permit safe and orderly shutdown of the facility if there is a total failure of the normal power supply sources. An uninterruptible (battery) power supply (UPS) system is provided for neutron criticality monitoring and alarms, radionuclide monitoring and alarms, air monitoring and sampling systems, fire alarms and supervision circuits, security surveillance system, access control, radio communications, and distributed control instrumentation system.

The facility is provided with a fire alarm and detection system, public address system, intercom system between the control room and process cell consoles, telephone system, exterior door access control and alarm system, wireless radio paging for selected personnel, building visual and audible alarm systems, and closed-circuit television system.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

8. Brief Physical Description of Project: (continued)

The instrumentation and controls for the R&H building provide for: (1) safe and efficient operation of handling and processing equipment throughout the entire facility; (2) safe shutdown integrity; (3) reliability, redundancy, modularization, and standardization, with components and subassemblies capable of being removed for inspection, maintenance, or replacement; (4) remote operation, when required; and (5) transmission of information to remote locations.

Automatic monitoring, alarming, and surveying instrumentation, is designed and used to detect and warn personnel of high radiation levels in controlled work areas.

Controls for mechanized and automated remote handling and processing equipment allow the equipment to be controlled locally, from gallery-located supervisory control panels, or centrally from the control room.

Heating, ventilating, and air-conditioning (HVAC) systems are designed to maintain the required temperatures, and ventilation- and confinement-control environments within the R&H building. Temperatures are controlled as required for the processes performed in the area served, and for the efficient performance of the operating personnel.

In the R&H building, the ventilation and confinement control provides the essential part of the final and internal confinement systems, and acts as a barrier to minimize the spread of radioactive contamination.

Nonprocess areas are protected by automatic wet-pipe sprinkler systems; critical areas, such as the control room and electrical equipment room, are provided with Halon 1301 systems.

o Support Facilities

Support facilities are provided to maintain a self-sufficient MRS facility. These include the following buildings.

Administration building - The administration building is designed to accommodate such functions as accountability, plant management, plant operations, finance and administration, health and safety, quality assurance, personnel, and public relations. To house these functions, the building has offices, a conference room, a computer room a lunchroom, a multipurpose room, storage rooms, a mail room, restrooms, and building equipment rooms. Dedicated office space has been provided for management, regulatory, and oversight personnel.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

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8. Brief Physical Description of Project: (continued)

Security-related buildings - Site security functions are housed in various buildings in strategic locations on the MRS facility site. The purpose of these facilities is to prevent unauthorized access, prevent removal of items of security interest, and provide physical protection and access controls to deter attempts at sabotage or theft. The security-related buildings are described below.

Security building - The Security building serves as security headquarters and provides facilities for the safeguards and security systems. It provides for the security personnel, with their administrative offices, and support facilities, as well as the Alarm Monitoring Station (AMS) and the radio communication system. The building has a lobby/waiting area, offices, multipurpose room, showers, restrooms, exercise room, building equipment rooms, and a hardened, bullet-resistant area that houses the MRS site secondary AMS. As part of the building, a security patrol vehicle parking enclosure, with three parking spaces, is provided.

Main Gate/Badgehouse - The Main Gate/Badgehouse is located at the main entrance, and is designed to serve as the initial observation and inspection point for all nonwaste transport vehicles entering the site, as well as security clearance and badge control for all visitors and employees. The building has a badge/clearance processing room, guardroom, passage room, waiting room, vestibules, restrooms, and equipment room.

Inspection Gatehouse - The Inspection Gatehouse provides for initial observation, inspection, and entrance clearance for all rail and transport vehicles delivering radioactive shipments to the facility. The building has a guard/inspector room, a restroom, and a storage room.

Protected Area Gatehouse - The Protected Area Gatehouse is located at the entrance to the MRS facility protected area. It serves as a badge checkpoint for monitoring and inspecting all employees entering and leaving the protected area. It has an inspection area for nontransport vehicles, such as delivery vehicles, maintenance vehicles, or any other vehicle authorized to enter the protected area. The building has an access control room, detection monitoring room, mechanical and electrical equipment rooms, and a hardened area containing the primary control alarm and remote surveillance room with its associated UPS system. This gatehouse is equipped with a hardened, primary AMS system; detection devices for metal, explosives, and radiation; and an x-ray inspection unit.

1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

8. Brief Physical Description of Project: (continued)

Site Services building - The Site Services building is a multifunction building. It provides shops for nonradioactive maintenance and fabrication, a process cell mockup area, offices for shop management, and other support areas. The shops included are machine, millwright, pipefitting, welding, sheetmetal, carpentry, plastics/glass/ceramic, electrical, instrument, paint, and a steam-cleaning area. The office area includes offices for shop management, physical plant operations personnel, and engineering personnel. Support functions include warehousing, mail, and reproduction. It also includes a computer room, a lunchroom, training and conference rooms, locker rooms, restrooms, and mechanical equipment rooms. This building also contains a control room for the redundant MRS centralized process and utility monitoring control and alarm system (DCS), which acts as a backup for that contained in the R&H building. Parking is provided adjacent to the building for onsite service vehicles.

Warehouse - The Warehouse serves as the main storage location in support of operations for the MRS support facilities. It is located near the Site Services building, and is provided with both truck and rail access. Besides the large warehouse area, the building has a waiting area, receiving room, restrooms, and an electrical equipment room.

Vehicle Maintenance building - The Vehicle Maintenance building provides routine maintenance and service for all vehicles dedicated for use at the MRS facility. A service station is located adjacent to the building. This building contains a locker room, restroom, lunchroom, railcar service area, semi-truck repair area, onsite vehicle overhaul and lubrication bays, paint shop, and supporting electrical and mechanical rooms.

Fire Station - The Fire Station provides complete facilities to house firefighting equipment, a paramedical ambulance personnel and equipment, fire-protection personnel (full-time and on-call), and limited combined cooking, dining, exercise, and training facilities. The building is divided into three major functional areas: (1) firefighting apparatus and equipment; (2) personnel facilities; and (3) building services. The building contains a lunchroom, nurse's station with an examination room, offices, restrooms, fire alarm and dispatch center, main apparatus room, breathing air cylinder and fire extinguisher charging rooms, and electrical and mechanical equipment rooms.

Standby Generator building - The Standby Generator building contains the equipment that provides electrical power upon loss of normal power. The building contains five main generator rooms; a sixth room houses all electrical switchgear. The Standby Generator building is a reinforced concrete structure, designed to withstand earthquakes and tornadoes.

8. Brief Physical Description of Project: (continued)

Steam Generator building - The Steam Generator building contains the steam boilers and associated equipment for the process and heating requirements of the R&H building.

Other Structures

Other structures to be constructed at the MRS facility include the CHTRU storage facility and the spent fuel and HAW/RHTRU storage facilities.

- CHTRU Storage Facility

  The CHTRU storage facility is designed to provide storage for CHTRU wastes generated onsite while processing the first 15,000 MTU of spent fuel. The waste stored in this facility arrives in drums from the solid low-level radwaste treating and packaging system in the R&H building.

  The facility is designed as an underground box structure. Each storage compartment is equipped with provisions for manually sampling the air and monitoring the interior for temperature and radiation level. The temperatures of the multidrum enclosures are measured manually by means of access ports through the roof plug. Air samples are also taken at these same ports, and are analyzed at the analytical laboratory in the R&H building.

  The facility contains a gravity-drain system which conveys any liquids from the compartments to two main drain sumps. Each sump is provided with a fixed beta and gamma radiation monitor and a level meter for monitoring the sump liquid. Both of these variables are indicated, recorded, and alarmed by the DCS in the R&H building. If required, collected liquid is removed by vacuum truck.

- Spent Fuel HAW/RHTRU Storage Facilities

  The spent fuel and HAW/RHTRU storage facilities are designed to store radioactive waste processed through the R&H building. The storage concept uses an array of sealed storage casks (concrete casks) containing the canisters of spent fuel stored in an open field above ground. The concrete cask and steel liner are designed for radiation shielding and to remove the heat by convection and thermal radiation.

8. Brief Physical Description of Project: (continued)

The concrete storage casks provide a sealed, dry storage container which also shields for intact spent-fuel assembly canisters, consolidated fuel rod canisters, drums of nonfuel-bearing components, and drums and canisters of RHTRU and high-activity waste. The storage casks are cylindrical, reinforced concrete structures with a stepped, carbon-steel-lined cavity for storing waste canisters and drums. A cylindrical concrete shield plug fits into the open top of the cavity and a steel cover plate is seal-welded to the liner flange to close the cask. For purposes of conceptual design, all casks have been designed with the same height and exterior configuration. The casks are 22-ft. high by 12-ft. dia. (outside diameter). The cask and the enclosed canisters provide double containment for spent fuel and will withstand credible natural phenomena and man-induced events.

Monitoring of the concrete cask liner and cover integrity is performed on a periodic basis. Sampling of a cask internal atmosphere is performed by removing an access cover bolted to the gas sampling port housing. An evacuated bottle with a valve is attached to the quick-disconnect fitting on the end of the assembly of compression fittings located inside the port housing. Gas samples are collected for analysis to determine the presence of any gaseous fission products or canister tag gas in the cask interior. Results obtained from cask samples indicate whether canisters or canisters and fuel rods have lost their integrity. Cask liner/cover integrity is tested by using a pressure-decay check.

Monitoring will also include temperature surveillance of the casks. Temperature measurement is accomplished by using thermocouples installed in tubes, extending from the cask exterior to the liners of spent fuel and related waste casks. The thermocouple/tube design allows for replacement operations in the storage facility if failure occurs.

Special Facilities

The hot cell equipment is specifically designed to disassemble and consolidate spent fuel assemblies and to seal the consolidated fuel rods within a steel canister. Equipment is provided to inspect the welds and decontaminate the canisters. Remotely-controlled cranes and transfer carts are provided to move spent fuel assemblies and canisters.

The sealed storage cask is transferred from the cask manufacturing area to the R&H building and from the building to the storage facility on a crawler-type transporter. Once in the storage facility, the cask is lifted from the transporter by engaging a special lifting fixture from the emplacement crane and setting the cask on a previously prepared concrete pad.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

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8. Brief Physical Description of Project: (continued)

Utilities

Utilities such as water, sanitary sewer, process waste sewer, electrical power distribution and fuel oil distribution systems are provided for the MRS facility.

Water from an offsite source will be piped to the MRS facility storage tank and distributed to all of the facilities onsite.

The MRS facility sanitary sewer system collects and treats domestic sewage. The system consists of a central sewage treatment plant and a collection system that collects raw sanitary sewage from uncontaminated areas of the R&H building and from the support buildings.

Process waste generated in the MRS facility that is not contaminated, but contains chemical constitutents harmful to the function of the sanitary sewage treatment system, is collected and treated by the process sewer system. The sewers lines drain to a lift sump, where the process sewage is neutralized as necessary and pumped to the process sewage treatment plant for clarification and filtration to remove the suspended solids and undesirable chemical constituents before disposal. The dewatered sludge is disposed of at an appropriate waste site, depending upon the chemical content of the sludge.

Normal electrical power is provided by independent transmission lines. The transmission lines terminate at the MRS facility main substation in an outdoor switchyard. The high voltage power is transformed to 5-kV and distributed to the various buildings. Standby power is generated onsite by diesel-engine-driven generators. Four generators are provided -- each capable of supplying one-third of the maximum standby load. Standby power is supplied to the critical equipment by automatic switchover equipment in the event both sources of normal power fail.

Fuel oil is provided at the facility. The fuel oil distribution systems supply the hot water boilers, steam boilers, and standby power generators. Fuel oil storage is above ground with the capacity equivalent to the supply needed for 45 calendar days of operation.

Standard Equipment

Standard equipment will consist of office, lunchroom, conference room, etc., furnishings, and all analytical equipment and furnishings in the laboratories. Also included with this item is the shop equipment in the site services and vehicle maintenance buildings. All site vehicles and utility equipment such as mobile, rubber-tired cranes, garbage trucks, fire engines, etc., will be provided as part of the project.

1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

8. Brief Physical Description of Project: (continued)

Major Computer Items

Major computer control systems are provided in the R&H building. The distributed control system monitors, alarms, and controls all process and utility systems within the R&H building. There are local operator control stations and the primary station is located in the control room of the building.

Another major computer system is the programmable logic controller for the process and canyon cell equipment. From the local work station, the operations of the in-cell equipment can be monitored and manually controlled as needed. The system has data storage and retrieval capability as well as graphics generation for the work stations.

9. Purpose, Justification of Need for, and Scope of Project:

The purpose of this project is to provide a facility for the monitored retrievable storage of spent nuclear fuel resulting from operation of the nation's civilian nuclear power plants. This request is prepared in conjunction with the submittal of a proposal to Congress for construction of an MRS facility in response to Section 141 of the Nuclear Waste Policy Act of 1982 (the Act or NWPA).

Having completed an environmental assessment, the conceptual designs, the need and feasibility study, and an evaluation of programmatic options, the DOE has concluded that an MRS facility located at the Clinch River site and designed to be an integral component of the waste management system could significantly improve the performance of the system. This conclusion was also influenced by the experience of the past three years in implementing the provisions of the Act and the resultant understanding of the managerial, regulatory, and institutional complexities of the waste management system.

The most significant advantages of an integral MRS facility are as follows:

1. Improvements in the reliability and flexibility of operations of the waste management system. These improvements would be realized by separating the acceptance of spent fuel from reactors from its emplacement in the repository. Furthermore, by being able to prepare waste for disposal, the MRS facility would allow the DOE to separate a major part of the waste management process (acceptance, transportation from the reactor sites, consolidation, and sealing in canisters) from uncertainties about the repository and to proceed immediately with detailed planning for, and implementation of, that part. The storage facility will obviate the need for planning and providing some additional at-reactor storage. Storage costs avoided range from $150,000,000 to $1,700,000 000, in 1985 dollars, depending upon the scenario considred.

1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

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9. Purpose, Justification of Need for, and Scope of Project (continued)

2. Improvements in system-development schedules and activities. Section 302(a)(5) of the Act obligates DOE, in return for payments of fees by the utilities operators, to begin to accept the spent fuel for disposal by January 31, 1998. DOE fully intends to meet this objective. By starting operations in 1996 and reaching full capacity by 1998, the MRS facility would allow the system to receive spent fuel at full-scale rates 5 years sooner than does the currently authorized system. The development of the transportation system will also be expedited, because the MRS facility will allow the DOE to determine the routing, logistics, and equipment requirements for shipments from reactors up to 5 years earlier. Moreover, the facility would provide a focal point for early integration of and deployment of some functions of the system.

3. Improvements in the performance of the transportation system. By allowing consolidated fuel to be shipped in dedicated trains, the MRS facility will significantly reduce the number of shipments. Furthermore, the MRS facility would serve as a hub for transportation operations, thus significantly enhancing the control and management of transportation operations.

Studies performed in support of the proposal to Congress show that, though there are other ways to achieve some of the advantages of an integral MRS facility, none of the alternatives examined in the need and feasibility study presents the same range of benefits while also providing equivalent feasibility and managerial control.

If approved, the MRS facility will receive and prepare spent fuel for emplacement in the geologic repository. The proposed facility will be capable of receiving, consolidating, packaging and shipping 3,000 metric tons of (uranium equivalent) spent fuel per year while operating three shifts per day, five days per week. The principal waste-preparation functions would be spent-fuel consolidation and loading into sealed canisters. Being uniform in size, seal welded, and free of radioactive contamination, these canisters will facilitate safer handling, shipping, and further processing at the repository. Consolidation will be performed by removing the spent-fuel rods from the hardware that holds them together in assemblies and rearranging them in a tighter array for greater efficiency in storage, handling, and transportation.

The canisters of spent fuel will be loaded into shipping casks and shipped to the repository in dedicated trains. An area for temporarily storing the spent fuel pending shipment to the repository will be provided in the principal waste-handling building of the MRS facility; it would accommodate up to 1,000 metric tons of uranium (MTU) in storage vaults in the building. However, at the start of MRS operations, which will precede waste acceptance at the repository, and later during temporary slowdowns at the repository, this large storage will be insufficient. The scope of the MRS facility will therefore also include a large storage yard in which the canisters of spent fuel will be stored in sealed concrete casks that will allow radiation monitoring and easy retrieval for shipment to the repository. The DOE is recommending that such storage capacity (total possession limit) be limited to 15,000 MTU.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

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9. Purpose, Justification of Need for, and Scope of Project: (continued)

The MRS facility will be designed, constructed, and operated such that the health and safety of the public and the quality of the environment will be protected. It will be licensed by the Nuclear Regulatory Commission. It will be a containment facility that will keep any releases of radioactive material well below regulatory limits, and its containment features are based on available and proved technology.

No significant adverse environmental impacts are expected from an integral MRS facility. The estimated total system risks and environmental costs do not differ significantly between systems with and without an MRS facility.

10. Details of Cost Estimate:

	Item Cost	Total Cost
a. Engineering, design and inspection		$102,800[a]
(1) Definitive Design	$ 64,900	
(2) Field Inspection	37,900	

This cost estimate is approximately 13,2% of the cost of construction.

[a] Includes escalation at the rates given on the attached Table A.1, Appendix A. Estimate based on conceptual design that is 100% complete.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

10. Details of Cost Estimate: (continued)

Item	Item Cost			Total Cost
b. Land and land rights				$ 0(a)
Construction costs				779,300(b)
(1) Improvements to land (site work, on- and off-site)			$ 93,500	
(2) Buildings			537,300	
(a) R&H building ($688/SF for 709,025 SF)		$487,800		
1. Building	$242,800			
2. Hot cell & In-building SF storage(c) (3,321,650 CF)	91,200			
3. HVAC	78,200			
4. Piping	26,100			
5. Electrical	24,900			
6. Instrumentation/communication/alarms	24,600			
(b) Support facilities ($251/SF for 195,040 SF)(d)		49,500		
(3) Other structures			37,800	
(a) CHTRU storage facility		2,000		
(b) SF and HAW/RHTRU storage facilities(e)		35,800		
(4) Special facilities			, 102,800	
(a) Hot cell equipment		90,500		
(b) Transporter & lifting equipment		12,300		
(5) Utilities (includes water, fuel oil, electrical power & sewers)			7,800	
c. Standard equipment				17,000(b)
(1) Furnishings and laboratory equipment			5,400	
(2) Shop equipment			3,200	
(3) Site vehicles and utility equipment			8,400	

(a) Cost to be incurred for land acquisition or use of site has not been determined.

(b) Includes escalation at the rates given on the attached Table A.1, Appendix A.

(c) Includes cost of 1,000 MTU of spent fuel canister storage area within the building.

(d) Support facilities include the following: Admin. bldg., Site services bldg., Security bldg., three Gate/Badgehouse, Vehicle Maint. bldg., Warehouse bldg., Water treatment facility, Sewage treatment facility, Steam generator bldg. Fire station, and Standby generator bldg.

(e) Spent fuel and HAW/RHTRU storage facilities include costs of fencing, intrusion detection and site work for 15,000 MTU of cask storage, and installation of concrete pads for 5,000 MTU of cask storage.

1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

10. Details of Cost Estimate: (continued)

Item	Item Cost	Total Cost
e. Major computer items		12,100(a)
(1) Distribution control system	3,100	
(2) Programmable logic controller system for hot cell	9,000	
Subtotal		911,200(a)
f. Contingency (approx. 17% of all items a through e)		193,000
Total Estimated Costs		$1,104,200(a)

(a) Includes escalation at the rates given on the attached Table A.1, Appendix A.

11. Method of Performance:

The project has been designated as a Major Systems Acquisition (MSA) for which the management provisions of DOE Order 5700.4A would apply. Procurement(s) will be made for work in design, construction management, operations, and technical support. A divison of work among a contractor(s) (a procurement strategy) has not been finalized. Construction and procurement would be accomplished by fixed-price or cost-plus-fixed-fee contract awards on the basis of competitive bidding and negotiations.

The construction and operation of the MRS facility would be under the purview of a DOE Project Office established in the DOE Oak Ridge Operations Office. The day-to-day management of the facility would be the responsibility of a DOE MRS project manager during the preoperational phase and an MRS plant manager during operations.

1. Title and location of project: Monitored retrievable storage facility,
Clinch River site, Tennessee

2. Project No.: 87-R-101

12. Funding Schedule of Project Funding and Other Related Funding Requirements ($K) (footnote 1)

	Prior Yrs. Cost and Budgeted Cost Thru 6/86 (footnote 2)	FY86 7/86 thru 9/86 (footnote 3)	FY87	FY88	FY89	FY90	FY91	FY92	FY93	FY94	FY95	FY96	TOTAL
A. Total Project Costs:	$	$	$	$	$	$	$	$	$	$	$	$	$
1. Total Facility Costs	0	0	2,200	19,900	30,900	26,200	52,100	208,400	271,200	288,300	194,100	10,900	1,104,200
(a) Construction line item (4)	0	0	0	0	0	0	0	0	0	0	0	0	0
(b) PE&D	0	0	0	0	0	0	0	0	0	0	0	0	0
(c) Operating exp. funded equip.	0	0	0	0	0	0	0	0	0	0	0	0	0
(d) inventories	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Facility Cost	$ 0	$ 0	$ 2,200	$ 19,900	$ 30,900	$ 26,200	$ 52,100	$ 208,400	$ 271,200	$ 288,300	$ 194,100	$ 10,900	$ 1,104,200
2. Other Project Costs	$	$	$	$	$	$	$	$	$	$	$	$	$
(a) Conceptual design	15,400	0	0	0	0	0	0	0	0	0	0	0	15,400
(b) Design verification (4,5)	0	0	1,900	3,200	500	3,900	7,000	5,900	200	0	200	0	22,800
(c) Site data verification (4)	0	200	3,900	1,800	1,200	0	0	0	0	0	0	0	7,100
(d) Operational support (4)	0	0	1,400	3,500	3,700	2,900	2,100	3,400	3,200	3,300	2,100	900	26,500
(e) Training and startup (4,6)	0	0	0	0	500	900	2,000	3,900	8,300	20,300	27,400	45,500	108,800
Total Other Projects	$ 15,400	$ 200	$ 7,200	$ 8,500	$ 5,900	$ 7,700	$ 11,100	$ 13,200	$ 11,700	$ 23,600	$ 29,700	$ 46,400	$ 180,600
Total Project Cost	$ 15,400	$ 200	$ 9,400	$ 28,400	$ 36,800	$ 33,900	$ 63,200	$ 221,600	$ 282,900	$ 311,900	$ 223,800	$ 57,300	$ 1,284,800

(1) See table E.8, Spending and Funding Schedule (millions of constant 1985 dollars) in Appendix E, Monitored Retrievable Storage Submission to Congress volume 3, Program Plan, Jan. 1986, DOE/RW-0035. Costs given in Table E.8 have been escalated for the given years per Appendix A of these data sheets.

(2) Actual costs through September 1985 plus authorized funds through June 1986.

(3) Funding requirements July 1986 through September 1986.

(4) Escalation is calculated per the previous reference.

(5) The cost of the established rod consolidation program, PCDP, have not been included. Transfer of such costs to the MRS may be desirable.

(6) Spare parts cannot be identified at this stage of design and are not separately estimated.

1. Title and location of project: Monitored retrievable storage facility,
Clinch River site, Tennessee

2. Project No.: 87-R-101

12. Funding Schedule of Project Funding and Other Related Funding Requirements (B0) (footnote 1) (continued)

	Prior Yrs. Cost and Budgeted Cost Thru 6/86 (footnote 2)	FY86 7/86 thru 9/86 (footnote 3)	FY87	FY88	FY89	FY90	FY91	FY92	FY93	FY94	FY95	FY96
3. Total Related Funding (1)	$	$	$	$	$	$	$	$	$	$	$	$
(a) Facility operating cost (4)	0	0	0	0	0	0	0	0	0	0	0	16,100
(b) Programmatic cap. equip. (5)	0	0	0	0	0	0	0	0	0	9,000	11,500	46,100
(c) Maintenance, repair, GPP, or other construction related to programmatic effort in the facility (6)	0	0	0	0	0	0	0	0	0	0	0	0
(d) Other programmatic support costs (7)	14,600	2,600	12,100	11,300	10,800	8,900	7,900	7,400	7,000	7,300	5,600	2,600
	$	$	$	$	$	$	$	$	$	$	$	$
Total Related Costs	14,600	2,600	12,100	11,300	10,800	8,900	7,900	7,400	7,000	16,300	17,100	64,800
	$	$	$	$	$	$	$	$	$	$	$	$
Total Related Costs Including Escalation (8)			13,400	13,200	13,400	11,700	10,500	11,000	11,000	27,300	29,900	122,200

(1) All costs not escalated are expressed in 1985 dollars.
(2) Actual costs through September 1985 plus authorized funds through June 1986.
(3) Funding requirements July 1986 through September 1986.
(4) There is a similar ramp down of operating costs during the loadout period of FY 2018 through FY 2021 as indicated for facility startup.
(5) Includes the cost to fabricate the sealed storage casks as required.
(6) Includes cost of capital improvements and modifications to the facility and construction of more concrete support pads for casks.
(7) Includes program management, regulatory compliance, and environmental evaluations costs.
Institutional costs for financial assistance/tax equivalency/impact statements are not included. Such costs are subject to negotiation under a consultation and cooperative agreement.
When such costs are specifically determined, they will be provided in updated data sheets.
(8) Escalation is calculated per the previous reference.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (BO)[a] (continued)

b. Other related annual costs (Estimated operating life of facility: 26 years)

1. Facility operating costs	$ 59,000
2. Programmatic capital equipment[b]	37,125
3. Maintenance, repair, GPP, or other construction related to programmatic effort in the facility[c]	10,600
4. Other programmatic support costs[d]	536
Total Related Costs	$107,261

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[a] All costs not escalated are expressed in 1985 dollars.

[b] Includes the cost to fabricate the sealed storage casks as required (12,000 - 13,000 MTU - Total)

[c] Includes cost of capital improvements and modifications to the facility and construction of more concrete support pads for cases (12,800 - 13,800 MTU).

[d] Includes program management, regulatory compliance, and environmental evaluations costs.

Note: 1) Decommissioning costs start in 2022 and continue through 2028.
2) Transportation costs and tax equalivancy payments are not included.

1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

A. Total Project Funding

1. Total Facility Cost

(a) Construction line item -- no narrative required.

(b-d) There are no plant engineering and design costs, no operating expense funded equipment cost, and no inventory cost associated with this facility. -- no narrative required.

2. Other Project Costs

(a) Conceptual design costs - the conceptual design was prepared by Ralph M. Parsons Co. beginning December 1983 and continuing through July 1986. Actual costs are totaled through September 1985 with the budget amount added through June 1986. Major deliverables were received in September 1985 with the subsequent contract time used for consulting and records close-out -- $15,400,000.

(b) Design verification cost - the conceptual design uses mature technologies for the spent fuel handling and processing subsystems. However, these "subsystems" have not been demonstrated as a combined system under the operating conditions and production rates required for the MRS facility. The design verification cost is the projected amount to perform these demonstrations -- $22,800,000.

(c) Site verification cost - the site data required for engineering design need to be confirmed and gathered for this activity -- $6,900,000.

(d) Operational Support - overview and liaison of design construction management contractor[1] $26,700,000.

(e) Training and startup cost - Training and startup testing costs for the facility -- $108,800,000.

(f) Decommissioning cost - decommissioning of the facility is planned for 2022 through 2026. Costs given are expressed in 1985 dollars -- $79,000,000.

B. Total Related Funding Requirements - per the current DOE Mission plan, the facility will have an operating life of 26 years (1996 through 2022). The design life of the facility is 50 years.

1. Facility operating costs - the major elements of the annual operating costs are a) the operations and maintenance staff for receiving, handling, processing and storing spent fuel and for upkeep of the building heating, ventilating, and air conditioning (HVAC) systems and equipment; b) spent fuel processing consumables including canisters, drums and high-efficiency particulate air (HEPA) filters; and c) utilities including electricity and fuel oil/diesel. The facility has a "ramp up and ramp down" cycle at each end of the normal operating period. The annual cost for the normal operating period is estimated to be $61,600,000 expressed in FY 1985 dollars.

DOE/MA-0064/4
Volume 3 of 7

Congressional Budget Request

Energy Supply Research and Development

Volume 3

FY 1987

U.S. Department of Energy
Assistant Secretary,
Management and Administration
Office of the Controller
Washington, D.C. 20585
February 1986

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

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DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1985 Actual BA	FY 1986 Estimate BA	FY 1987 Request BA
Appropriations Before The Energy and Water Development Subcommittees:			
Energy Supply Research and Development	1,967,490	1,696,298	1,254,162
Uranium Enrichment	237,956	190,512	---
General Science and Research	724,860	655,928	773,400
Atomic Energy Defense Activities ..	7,322,321	7,231,664	8,230,000
Departmental Administration	128,602	150,319	151,082
Alaska Power Administration	3,233	3,245	2,881
Bonneville Power Administration ...	284,771	330,000	276,100
Southeastern Power Administration .	35,744	---	19,647
Southwestern Power Administration .	31,208	29,191	25,337
Western Area Power Administration .	218,230	195,910	240,309
Western Area Power Emergency Fund .	---	---	---
Federal Energy Regulatory Commission	54,543	41,989	20,325
Nuclear Waste Fund	327,669	499,037	769,349
Geothermal Resources Development Fund	121	69	72
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	$11,336,748	$11,024,162	$11,762,664

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1985 Actual BA	FY 1986 Estimate BA	FY 1987 Request BA
Appropriations Before Interior and Related Agencies Subcommittees:			
Alternative Fuels Production	$ 1,169,895	$ ---	$ ---
Clean Coal Technology	---	---	---
Fossil Energy Research and Development	289,048	311,954	82,767
Naval Petroleum and Oil Shale Reserves	156,874	13,002	127,108
Energy Conservation	457,436	427,512	39,433
Energy Regulation	27,139	23,423	21,850
Emergency Preparedness	6,045	5,750	6,044
Strategic Petroleum Reserve	2,049,550	107,533	---
Energy Information Activities	60,919	57,724	59,651
Subtotal, Interior and Related Agencies Subcommittees	4,216,906	946,898	336,853
Subtotal, Energy and Water Development Subcommittees	11,336,748	11,024,162	11,762,664
Subtotal, Department of Energy	15,553,654	11,971,060	12,099,517
Permanent - Indefinite Appropriations:			
Payments to States	1,052	570	570
Total, Department of Energy	$15,554,706	$11,971,630	$12,100,087

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
ENERGY & WATER SUBCOMMITTEE				
HEADQUARTERS	4,865	4,965	-18	4,947
FIELD	9,133	9,185	111	9,296
SUBCOMMITTEE TOTAL	13,998	14,150	93	14,243
INTERIOR SUBCOMMITTEE				
HEADQUARTERS	1,353	1,304	-166	1,138
FIELD	907	896	-226	670
SUBCOMMITTEE TOTAL	2,260	2,200	-392	1,808
GRAND TOTAL	16,258	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,258	16,218	-497	15,721

DEPARTMENT OF ENERGY
F Y 1987 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
10:ENERGY SUPPLY RESEARCH AND DEV	937	934	-34	900
HEADQUARTERS	811	820	-28	792
FIELD	126	114	-6	108
15:URANIUM ENRICHMENT	69	66	1	67
HEADQUARTERS	58	55	1	56
FIELD	11	11	0	11
20:GENERAL SCIENCE AND RESEARCH	37	39	0	39
HEADQUARTERS	37	39	0	39
25:ATOMIC ENERGY DEFENSE ACTIVITI	2,618	2,702	131	2,833
HEADQUARTERS	496	518	9	527
FIELD	2,122	2,184	122	2,306
30:DEPARTMENTAL ADMINISTRATION	3.307	3,332	-5	3,327
HEADQUARTERS	1,721	1,726	0	1,726
FIELD	1,586	1,606	-5	1,601
34:ALASKA POWER ADMINISTRATION	37	38	0	38
FIELD	37	38	0	38
36:BONNEVILLE POWER ADMIN	3,510	3,480	0	3,480
FIELD	3,510	3,489	0	3,480
38:SOUTHEASTERN POWER ADMIN	38	40	0	40
FIELD	38	40	0	40
42:SOUTHWESTERN POWER ADMIN	186	186	0	186
FIELD	186	186	0	186
46:WESTERN AREA POWER ADMIN	1,181	1,160	0	1,160
FIELD	1,181	1,160	0	1,160
50:WAPA - COLORADO RIVER BASIN	219	219	0	219
FIELD	219	219	0	219
52:FEDERAL ENERGY REGULATORY COMM	1,617	1,659	0	1,659
HEADQUARTERS	1,617	1,659	0	1,659
54:NUCLEAR WASTE FUND	238	292	0	292
HEADQUARTERS	123	147	0	147
FIELD	115	145	0	145
56:GEOTHERMAL RESOURCES DEV FUND	2	1	0	1
HEADQUARTERS	2	1	0	1
65:FOSSIL ENERGY RESEARCH AND DEV	714	700	-161	539
HEADQUARTERS	151	135	-26	109
FIELD	563	565	-135	430
70:NAVAL PETROL & OIL SHALE RES	104	104	-9	95
HEADQUARTERS	23	23	0	23
FIELD	81	81	-9	72
75:ENERGY CONSERVATION	333	352	-134	218
HEADQUARTERS	208	227	-79	148
FIELD	125	125	-55	70
80:EMERGENCY PREPAREDNESS	74	71	0	71
HEADQUARTERS	74	71	0	71
81:ECONOMIC REGULATION	377	340	-50	290
HEADQUARTERS	377	340	-50	290
85:STRATEGIC PETROLEUM RESERVE	178	152	-32	120
HEADQUARTERS	40	27	-5	22
FIELD	138	125	-27	98
90:ENERGY INFORMATION ACTIVITIES	480	481	-6	475
HEADQUARTERS	480	481	-6	475
94:ADVANCES FOR CO-OP WORK	2	2	0	2
FIELD	2	2	0	2
GRAND TOTAL	16,258	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,258	16,218	-497	15,721

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Energy Supply, Research and Development Activities

(Including Transfer of Funds)

For expenses of the Department of Energy activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for energy supply, research and development activities, and other activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction or expansion; purchase of passenger motor vehicles (not to exceed [17] 18 for replacement only), [$1,989,671,000] $1,254,162, to remain available until expended [of which $200,000,000]; in addition, $584,158,000 shall be derived by transfer from Uranium Supply and Enrichment Activities provided in prior years[, and of which $17,400,000 shall be derived by transfer from Operation and Maintenance, Southeastern Power Administration; and of which $25,000,000 shall be available only for construction of]: Provided, That funds available under this head in Public Law 99-141 for the Advanced Science Center, the Center for Science and Technology, the Center for Energy and Biomedical Technology, the Energy and Mineral Research Center, and the Demonstration Center for Information Technologies [as described in the report accompanying this Act; together with not to exceed $6,000,000, to be derived from revenues from activities of the Technical Information Services, which shall be credited to this account and used for necessary expenses and shall remain available until expended], shall be available for other expenses of energy supply, research and development activities. (Public Law 99-141, making appropriations for energy and water development, 1986.)

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(Budget Authority in Thousands of Dollars)

	FY 1985 Actual	FY 1986 Estimate	FY 1987 Request
Solar Energy	$ 171,587	$ 144,624	$ 72,292
Geothermal	29,890	26,601	17,930
Hydropower	447	401	---
Electric Energy Systems	19,717	11,540	7,619
Energy Storage Systems	18,542	17,292	8,600
Nuclear Energy R&D	412,612	375,684	330,900
Remedial Action & Waste Technology .	170,365	230,047	294,100
Civilian Waste R&D	25,086	16,064	6,500
Environmental, Safety and Health ...	38,053	46,921	76,080
Biological and Environmental Research	187,746	179,950	196,365
Liquified Gaseous Spill Test Facility	4,299	1,732	1,200
Magnetic Fusion	429,553	365,469	333,000
Basic Energy Sciences	410,800	433,770	441,370
Energy Research Analysis	2,970	2,508	3,550
University Research Instrumentation.	4,950	6,254	5,000
University Research Support	10,098	10,296	10,975
Advisory and Oversight Program Direction	2,900	2,674	2,900
Multi-Program Laboratories Facilities Support	33,200	39,024	60,190
Small Business Innovation Research Program	26,724	---	---
In-House Energy Management	14,821	11,709	18,900
Technical Information and Management	13,442	12,413	10,775
Policy and Management	3,380	3,497	3,807
Subtotal, Energy Supply R&D ...	2,029,890	1,939,528	1,899,951
Less Use of Prior Year Balances and Other Adjustment	-62,400	-243,230	-645,789
Total, Energy Supply R&D............	$1,967,490	$1,696,298	$1,254,162

DEPARTMENT OF ENERGY
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
VOLUME 3
ENVIRONMENT, SAFETY AND HEALTH

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CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Monitored retrievable storage facility, Clinch River Site, Tennessee

2. Project No.: 87-W-101

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (continued)

2. Programmatic capital equipment costs - to provide for the interim storage capability at the facility sealed storage casks (concrete casks) are required for storing the canisters of spent fuel. It is anticipated that a fabrication plant would be constructed near the MRS facility to supply these casks. The cost of the facility is included in the cost of the casks. The annual cost for the normal fabrication rate is estimated to be $52,700,000 expressed in 1985 dollars.
3. Maintenance, repair, GPP, or other construction related to programmatic effort in the facility - it is anticipated that General Plant Projects (GPP) or other major modifications to the facility and/or processing areas will require an estimated $10,300,000 per year expressed in 1985 dollars. In addition, twice in the early years of the facility (1998 and 2000) more concrete pads will be required for the emplacement of the sealed storage casks. These are estimated to cost $12,000,000 each (in both 1998 and 2000) expressed in 1985 dollars.
4. Other programmatic support costs - The overall program management from start of design-construction management procurement through decommissioning is estimated to cost $100,700,000 expressed in 1985 dollars. Included in this item is the program management cost, regulatory compliance cost, and environmental evaluations cost. Not included in this item are costs for institutional relations, such as revenues equivalent to taxes, consultation and cooperation costs, aid for mitigating impacts of construction and operation, transportation costs, and licensing and permitting costs associated with other federal, state and local entities. The majority of these costs are expended prior to the operation of the facility. As these costs become available, they will be provided in the annually required updated construction project data sheets. Program management during the normal operating period of the facility (1998 through 2017) is estimated to be $400,000 per year.

Appendix A

Inflation Index (1985 = 100)

Table A. 1
Construction

Year	Index*	% Annual Change
1985	100.0	0.0
1986	104.9	4.9
1987	110.5	5.3
1988	116.8	5.7
1989	123.7	5.9
1990	131.1	6.0
1991	139.4	6.3
1992	148.1	6.3
1993	157.5	6.3
1994	167.4	6.3
1995	177.9	6.3
1996	188.6	6.0

Table A.2
Operating

Year	Index*	% Annual Change
1985	100.0	0.0
1986	103.7	3.7
1987	107.8	4.0
1988	112.4	4.2
1989	116.9	4.0
1990	121.2	3.7
1991	125.3	3.4
1992	129.3	3.1

*Each index number was rounded to one significant digit before applying the percentage annual change. The index numbers are compounded for each subsequent year.

Sources: Energy Information Administration
Annual Energy Outlook
1984 With Projections To 1995
DOE/EIA-0383(84), Table A 19, p. 222
6% annual change rate assumed after 1995

Office of Management and Budget
3.1% annual change rate assumed after 1991

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
Environment, Safety and Health

PROGRAM OVERVIEW

On September 18, 1985, Secretary of Energy John S. Herrington announced a series of initiatives to strengthen the environment, safety, and health function within the Department of Energy. These new initiatives are the result of a thorough review of the Department's environment, safety, and health functions which identified some areas that need to be strengthened.

There are three key elements of the Department's long-range plan which will provide the framework for a strong emphasis on environmental and safety matters at the Department of Energy. These elements are, of course, to be undertaken in addition to the base program for Environment, Safety, and Health (EH). The first of the elements will be to consolidate oversight responsibility for the environment, safety, quality assurance, and health function under the direction of an Assistant Secretary for Environment, Safety, and Health. The new ES&H office will be integrally involved in the operations of the Department at all levels, will provide line management with more detailed information about the nature of the safety and environmental problems to be dealt with, and will oversee more directly the corrective action to be taken and the safety and environmental aspects of ongoing operations.

Second, EH will conduct a baseline survey of all DOE facilities to identify existing areas of environmental risk. Results from the survey will be used to prioritize areas of environmental risk and to correct environmental problems in a knowledgeable and orderly manner.

Third, EH will perform technical safety appraisals of DOE's high- and moderate- hazard nuclear facilities, approximately 85 in number. These will be multidisciplinary "on the ground" appraisals to determine compliance with safety requirements, industry lessons learned, and licensed facility requirements, as appropriate. As with the environmental survey, results of these appraisals will be used to implement corrective measures.

Other elements of the Department's strengthened program include a field reporting and computer assisted tracking system, a more aggressive ES&H role in the development and implementation of environmental and safety policy for the Department, including more detailed Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act (RCRA/CERCLA) policy guidance and enhanced liaison with State and Federal agencies.

The Secretary's new initiatives in environment, safety, and health are being implemented in FY 1986 utilizing existing Departmental resources. Our FY 1987 budget request, as more fully discussed below, also reflects these new initiatives.

The goal of the Environment, Safety and Health program as the principal advisor to the Secretary is to maintain an effective system throughout the Department in order to:

- assure conformance of the Department's activities with all applicable environmental laws and regulations and assure that the health and safety of workers and the public are protected
- assure that national environmental protection goals are incorporated into the formulation and implementation of energy programs
- assure that environmental and safety concerns are identified, prioritized and addressed through corrective and remedial actions, and areas of environmental and safety risk are reduced

- develop policy options for the Department on the effects of National environmental policy on U.S. energy industries and energy supply and demand

- provide liaison with other federal agencies, such as EPA, concerning regulatory efforts and specific actions of those agencies that may have an impact on DOE operations.

As its principal basis in law, the Environment, Safety and Health program responds directly to the following statutory requirements:

- DOE Organization Act of 1977 - requires the program to advise the Secretary on the conformance of the Department's activities to environmental and safety laws and principles.

- PL 79-585, Atomic Energy Act of 1946 - authorizes research and development for medical, biological and health purposes and for protection of health and promotion of safety during research and production activities using fissionable and radioactive materials.

- PL 83-703, Atomic Energy Act of 1954 - exempts DOE (AEC) contractors from licensing requirements, requires maintenance of health and safety and preservation and enhancement of a viable environment during research and production.

- PL 91-596, Occupational Safety and Health Act (OSHA) of 1970 - exempts certain DOE contractor-operated workplaces from its requirements, and permits agencies to prescribe and enforce occupational health and safety standards.

- PL 96-510, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - provides for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment, and the cleanup of inactive hazardous waste disposal sites.

- PL 94-580, Resource Conservation and Recovery Act (RCRA) - sets forth requirements to ensure the safe and environmentally acceptable management of solid wastes.

- PL 91-190, National Environmental Policy Act (NEPA) - requires Federal agencies to consider environmental factors in its decisionmaking process for all actions which may affect the quality of the human environment.

- PL 92-500, Clean Water Act - establishes a comprehensive program for controlling the introduction of pollutants into the Nation's water.

- PL 91-604, Clean Air Act - establishes requirements for controlling the introduction of airborne pollutants into the environment.

- PL 93-523, Safe Drinking Water Act - establishes a national program for the protection of drinking water through National Drinking Water Standards, and a program to prevent underground injections which would endanger drinking water sources.

- PL 89-665, National Historic Preservation Act - requires Federal agencies to take steps to protect historic and cultural resources which may be affected by project activities.

- PL 93-205, Endangered Species Act - establishes a means for the protection of threatened and endangered plant and wildlife species.

- PL 85-624, Fish and Wildlife Coordination Act - assures that fish and wildlife resources receive equal consideration with other values in the planning and development of projects affecting water resources.

- PL 94-469, Toxic Substances Control Act - allows for the gathering of information on all new and existing chemical substances and allows for the control of any of those substances determined to cause unreasonable risk to public health or the environment.

- PL 92-583, Coastal Zone Management Act - provides for a comprehensive and coordinated planning effort for the protection of coastal resources, and requires a determination of consistency with coastal zone management plans.

- PL 93-633, Hazardous Material Transportation Act - establishes the framework for regulatory efforts to ensure safe packaging, handling, and transportation of hazardous materials when transported in commerce.

- Executive Order 11988, Floodplain Management - allows Federal agencies to use floodplains for projects only if there are no practicable alternatives available and only if measures have been taken to protect the floodplain.

- Executive Order 11990, Protection of Wetlands - requires Federal agencies to avoid wetlands where practicable.

- PL 96-294, The Acid Precipitation Act of 1980 - requires Departmental participation and support of the National Acid Precipitation Assessment Program.

It is also a program goal, based upon the language of the Department of Energy Organization Act of 1977, to assure that the energy impacts of current and proposed environmental requirements are compatible with National energy goals and conversely, that Federal energy decisions reflect National environmental goals.

The Environment, Safety and Health Program (EH) consists of six major units: Nuclear Safety, Operational Safety, Quality Assurance, Environmental Audit and Compliance, Environmental Guidance, and Environmental Analysis. Their activities include: the development of policies and standards; oversight, including surveys, audits and appraisals to monitor program and field performance in complying with DOE safety and environmental policies and standards and in achieving effective safety and environmental protection performance; technical assistance as needed to foster compliance; maintenance of the resources to respond to radiological emergencies; the review of NEPA documents; and the analysis of energy/environmental issues pertaining to the energy supply industry arising from environmental legislative and regulatory activities.

The program is essential to the continued effective operations of all programs of the Department of Energy.

Fiscal Year 1985 Accomplishments

- In September 1985, the Secretary announced a restructuring of the Department's environmental, safety and health program including, "oversight responsibility for the environment, safety and health function in the Department will be consolidated and upgraded under the direction of an Assistant Secretary for Environment, Safety and Health. At present oversight responsibility for environment and safety is scattered among the Program Assistant Secretaries. Consolidating this function under a strong Assistant Secretary will establish line responsibility and top management commitment to safety and environment. ES&H will be stronger and better organized; it will have more oversight tools and it will be intergrally involved in the functions of the Department at all levels."

- During 1985 the Departmental ES&H programs were examined and changes implemented to improve the independent overview program. These changes included: greater involvement in the authorization process for DOE nuclear operations, and initiation of technical appraisals of DOE high hazard nuclear operating facilities. Technical appraisals provide for a more direct evaluation of the safety of the operation of such facilities.

- Initiated the planning for the performance of in-depth technical safety appraisals of major DOE operating facilities.

- Completed the planning for greater involvement in the authorization process for DOE nuclear operations, and began by performing technical evaluations of some safety analysis reports and taking concurrence actions on several authorizations.

- Conducted two national level drills that demonstrated the ability of the Department to bring its extensive radiological emergency response resources to a nuclear accident.

- Completed the neutron criticality alarm system for use where gamma background radiation is high or where large structures attenuate gamma radiation from a criticality accident.

- Published three reports describing current measurement practices at DOE facilities with recommendations for improvement (air monitoring, beta, internal dosimetry), and developed protocol for evaluation of effluent monitors at DOE facilities.

- Completed development of calibration procedures for extremity dosimeters and guidelines for calibration of portable survey and installed instruments, and developed and field tested a prototype device for "total dose" measurement from combined neutron and gamma exposure.

- Initiated a program to evaluate the effluent and environmental monitoring programs at DOE facilities for the purpose of identifying and correcting program deficiencies.

- Amended DOE radiation standards for protecting members of the public in the vicinity of DOE nuclear facilities to incorporate current recommendations of national and international standards organizations.

- Validated the use of a modified psychological profile test to be used in the Personnel Assurance Program established by Defense Programs for employees working with nuclear devices and in other sensitive positions.

- Completed six medical appraisals of contractor occupational medical programs.

- Conducted thirty-two seminars and workshops in the Management Oversight and Risk Tree (MORT) system safety program in FY 1985.

- Initiated an effort to improve the Department's reporting of environmental trends and incidents.

- The Department's System Safety Development Center provided 2,500 hours of consultation to professionals in DOE operations seeking advice on system safety methodologies, risk assessment, and performance measurement.

- Published the Status of Quality Assurance Implementation in DOE between July 1983 and December 1984. The initial report had covered the time span beginning with the DOE quality assurance policy being established in August 1981 to July 1983.

- Performed two quality assurance appraisals of operations offices and contractors responsible for reactor and nuclear facilities operations; supported ten operations office audits of their contractor quality assurance programs; visited four field organizations to review and evaluate actions taken to enhance quality performance since the initial OQAS survey; and conducted an in-depth quality assurance appraisal of the Bonneville Power Administration.

- Provided protection to DOE projects from non-compliance delays by completing action on numerous requests from DOE programs for National Environmental Policy Act (NEPA) related support, including: approximately 180 analyses to determine/confirm the level of NEPA documentation requirements, i.e., Environmental Impact Statements (EIS's), Environmental Assessments (EA's), or neither, for DOE actions; and 125 major independent reviews of NEPA EIS's and EA's.

  Examples of major EIS reviews performed included those for: Waste Management Activities for Groundwater Protection at the Savannah River Plant, South Carolina; the Oak Ridge Central Waste Disposal Facility; Bonneville Power Administration's Fall River-Lower Valley Transmission Project; Western Area Power Administration's Blue River-Gore Pass Transmission Project; the Niagara Falls Storage Site Remedial Action Project; and the Salt Lake City Remedial Action Project.

- Developed a pilot regulatory review and coordination system to systematically identify, review, analyze, and prepare a regulatory response on external environmental, safety, and health regulatory activities which have the potential for affecting DOE's projects and programs.

- Coordinated the Department's review of EPA's final high-level waste standards (40 CFR 191), developed DOE positions reflecting the views of multiple affected programs, and served as the advocate for DOE positions with other agencies.

- Continued to participate in Departmental activities and assessments concerning acid rain and other transboundary air pollution issues.

- Participated in regulatory analysis studies and work groups that develop the scientific basis for regulations and legislative proposals; this year emphasizing hazardous and solid waste including "Superfund" and Resource Conservation and Recovery Act (amended 1984) proposals, groundwater impacts, national ambient air quality standard revisions and industrial boiler standards.

- Participated in the update of the environmental projections and policy sections of the fifth National Energy Policy Plan.

- Continued to participate in the interagency Indoor Air Quality Task Group and to provide assessments of indoor air pollution issues concerning DOE for these interagency activities.

FY 1986 Projected Accomplishments:

- Implementing the Environmental Survey by completing all necessary planning and preparatory activities and initiating the environmental baseline survey for the first group of 5 sites. Planning and preparatory activities include: assembling a staff; procuring support services; analyzing available site information; developing an implementation plan and schedule for the survey; developing detailed site survey plans for each site to be surveyed; developing survey procedures; developing sampling procedures; developing risk assessment methodologies and criteria for establishing budget priorities; and developing a database for recording and managing the survey results.

- Refining the ES&H ranking system for budgetary prioritization of the Department's environmental and safety upgrade projects.

- Implementing additional modules on the Safety Performance Measurement System for environmental and safety reporting, radiation exposure data, and standards information, and a personnel and resources directory.

- Conducting in-depth technical safety appraisals of the safety of operations at Category A reactors (20 megawatts thermal or greater), high hazard nuclear facilities, and selected moderate hazard nuclear facilities. These technical safety appraisals will be documented, multidiscipline appraisals. They will help to assure Department-wide consistency and application of particular safety elements of the ES&H program, nuclear industry lessons learned, and licensed facility requirements, as appropriate. The majority of the appraisal activity will take place at the facility site which will be examined and evaluated to determine compliance with EH requirements.

- Reviewing reactor safety analysis reports and nuclear facility safety analysis reports. These are in-depth multidisciplinary reviews to assure that an adequate degree of protection of the environment, health, and safety has been designed into reactors, high hazard nuclear facilities, and selected moderate hazard nuclear facilities.

- Development of the Nuclear Criticality Safety Information System will continue with the system being expanded to a nuclear safety database which will include human factors and other nuclear safety data.

- Conducting surveys of about 20 DOE and civilian nuclear sites to develop baseline radiological data.

- Developing a "good practice" manual for uranium facilities and a training manual for radiation protection, and conducting workshops on internal dosimetry, beta dosimetry, neutron dosimetry, effluent monitoring and radiological calibration.

- Initiating a routine DOE Laboratory Accreditation Program for personnel dosimetry and developing a pilot program to test performance criteria for instrument calibration.

- Developing and implementing mandatory radiological practices for effluent and environmental monitoring at DOE facilities.

- Conducting technical evaluations of aviation operating procedures including eight appraisals of DOE aviation operating contractors.

- Conducting Nuclear Safety Program Appraisals of operations offices/contractors responsible for reactor and nuclear facilities operations; participating in twelve operations office audits of their contractor quality assurance programs; and conducting quality assurance management appraisals of four field organizations and one Headquarter Program Office for the implementation of quality assurance requirements.

- Developing guidelines on concept and content of a DOE Quality Improvement Program and Operation Readiness Reviews, and on the application and implementation of quality assurance principles and requirements to DOE computer program software and research and development programs.

- Providing environmental compliance guidance, assistance, and oversight to DOE programs, projects, and other initiatives subject to environmental requirements.

- Completing action on numerous DOE program requests for support, including approximately 180 analyses to determine/confirm the level of NEPA documentation requirements for DOE actions; and 125 major independent reviews of NEPA Environmental Impact Statements (EIS's) and Environmental Assessments (EA's).

Examples of major EIS reviews include those for: High-Level and Transuranic Waste Management Activities at Hanford; the Decommissioning of the 100 Area Production Reactors at Hanford; Thermal Impact Mitigation Measures at the Savannah River Plant; Remedial Action Project at Durango, Colorado; Bear Creek Clean-up at Oak Ridge; Process Facility Modification at Hanford; Bonneville Power Administration's Intertie Access Policy; and the New Pacific Northwest-Pacific Southwest AC Intertie.

- o Implementing DOE's regulatory review and coordination system which was developed to systematically identify, track, analyze, and prepare regulatory responses on external environmental, safety, and health regulatory activities potentially affecting DOE activities and operations. Significant activities are anticipated with respect to the RCRA and CERCLA Acts.

- o Revising and reissuing the Environmental Compliance Guide for Project Development which details the DOE NEPA process and outlines environmental requirements, and revising and updating a series of Reference Books on the full range of environmental statutes and regulations applicable to DOE project development activities.

- o Continue to participate in Department activities, analyses and research related to global environmental issues such as climate change, deforestation, nuclear winter. Much of this work involves participation in interagency forums.

- o Providing medical and psychological technical support for the development of human reliability programs for critical and sensitive DOE operations.

- o Developing medical standards for DOE critical and sensitive operations.

- o Participate in studies, seminars and work groups that address the current state-of-knowledge in global and international environment and natural resource issues; concentration on activities that relate those issues to energy production/development and the interaction between national systems and social and economic demands.

- o Continue to provide Departmental leadership and representation to key interagency environmental policy task forces, work groups and advisory bodies. This year such efforts are likely to focus on global and/or mesoscale climate issues that may result from changes in atmospheric levels of greenhouse gases, the after effects of nuclear war, and ozone layer depletion as a result of continued hydrocarbon production/use.

- o Develop a new environmental emissions projection system that is compatible with Date Resources Incorporated/World Oil Model economic and energy output to produce emissions outputs for routine displays at the Federal Administrative Regions level.

- o Continue updating of The Technology Environmental Characterizations Handbook (March 1983) leading to a loose-leaf notebook replacement of current reports.

Program Objectives for FY 1987 through FY 1990 are to:

- o Ensure that the Department's operating facilities are moving towards compliance with all applicable environmental requirements and reduce areas of existing environmental risk by completing the baseline environmental survey and conducting a continuing program of environmental audits.

- o Assist in and make recommendations for corrective measures, including assistance with site specific compliance and with other agencies' regulatory requirements.

- Improve the analytic and technical base of the system for budgetary ranking of the Department's environmental and safety upgrade activities.
- Perform more extensive safety reviews of DOE facilities, including Technical Appraisals of Category A reactors and high hazard nonreactor nuclear facilities.
- Continue the review and concurrence of reactor and nonreactor nuclear facility safety analysis reports covering new facilities or modifications and upgrading of existing facilities.
- Continue to coordinate the exchange and sharing of training resources among operating contractors to improve the cost effectiveness and quality of training.
- Issue revised environmental protection, safety and health protection policy guidance for Departmental operations, including comprehensive direction on hazardous waste (RCRA/CERCLA) requirements.
- Play an aggressive role in developing and coordinating comments on the emerging environmental statutes, rules and policies of other agencies potentially impacting DOE.
- Maintain a viable radiological emergency response capability for DOE facilities, in coordination with the Federal Emergency Management Agency, which will be made available on request to other federal and state authorities.
- Develop improved methods for internal radiation dose assessments, to assure compliance with radiation exposure limits recommended by National (e.g., ANSI N13.30, EPA Occupational Exposure Guidance) and International authorities (e.g., ICRP 26 and 30).
- Provide technical advice to field managers on compliance with hazardous waste management under Order DOE 5480.2, and coordinate Departmental responses to reporting requirements under the 1984 Resource Conservation and Recovery Act amendments and on DOE inactive waste site compliance under Order 5480.14. This includes management of DOE's priority list of inactive waste sites and required activities under the National Contingency Plan.
- Establish and operate a computer-assisted information tracking system for environmental and safety data to monitor compliance and progress in completion of corrective actions, and to assist ES&H in reducing areas of environmental and safety risk.
- Support and assist DOE program and field organizations in their development and implementation of the Quality Improvement Program concept.
- Perform quality assurance appraisals of field organizations' programs.
- Protect DOE activities from delays by providing assistance to the Department's programs and projects in preparing National Environmental Policy Act (NEPA) documents and in securing other environmental approvals, permits, and clearances for new projects; and by independently reviewing NEPA and other supporting environmental documents to assure adequate compliance.
- Coordinate with other Federal agencies to resolve difficult compliance issues and to assure the Department's concerns are addressed in emerging regulatory requirements.
- Continue to participate in Departmental activities and assessments concerning acid rain, other transboundary pollutants, and personal exposures.

- o Develop a responsive data base and set of information papers concerning the scope and nature of toxic air pollutants related to energy supply and use.
- o Develop methodologies and data required to determine policy implications of ground water legislation.
- o Improve assessment capabilities for determining the economic, environmental and health tradeoffs involved in the legislative and regulatory initiatives for hazardous substances.

Programmatic Benefits

Accomplishment of these specific objectives will: help assure Departmental compliance with environmental protection, safety and health protection laws and regulations, particularly at nuclear and defense programs installations; enable the Department to establish priorities and develop long-range planning for correcting environmental problems and reducing potential risks; prevent unnecessary DOE program and project delays caused by environmental issues; ensure that a balance is struck between energy and environmental concerns in the formulation of broad national energy policy goals; foster the establishment and maintenance of effective quality assurance procedures and methods in all of the activities of the Department of Energy; and assure adequate protection of the public from current DOE activities, the results of past nuclear operations conducted by the Government, and possible harm associated with radiological emergencies.

The following map shows the diversity of DOE facilities around the United States which must implement environmental protection, safety and health protection requirements. Statistical data on the quality of the field's compliance with these ES&H requirements, in comparison with the compliance experience of industry, is shown in the Operational Safety subprogram section of the budget.

Figure 1: Map of DOE Field Facilities and Operations

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

Environment, Safety and Health

Energy Supply Research and Development
(Tabular dollars in thousands, Narrative material in whole dollars)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	FY 1987 Request vs. Base
Environment, Safety and Health Operating Expenses:					
1. Nuclear Safety	$16,916	$14,916	$14,916	$15,225	+309
2. Quality Assurance	915	914	914	800	-114
3. Operational Safety	5,060	6,373	6,373	3,900	-2,473
4. Environmental Audit and Compliance	0	7,500	7,500	36,000	+28,500
5. Environmental Guidance	5,540	3,623	3,623	3,900	+277
6. Environmental Analysis	2,392	2,457	2,457	2,700	+243
7. Program Direction	5,730 a/	9,695 d/	10,094	11,473	1,379
(Policy and Management)	(792)	(481)	(505)	(605)	(+100)
Subtotal	$36,553	$45,478 c/	$45,877 c/	$73,998	+28,121
8. Capital Equipment	1,500	1,443	1,443	2,100	+657
Total: Operating Expenses	36,553	45,478	45,877	73,998	+28,121
Capital Equipment	1,500	1,443	1,443	2,100	+657
Environment, Safety and Health	$38,053	$46,921	$47,320	$76,098 e/	+28,778
Staffing Total FTE's b/	100	125	125	127	+2

Authorization: Sec. 103, PL 93-438 and Sec. 203, PL 95-91

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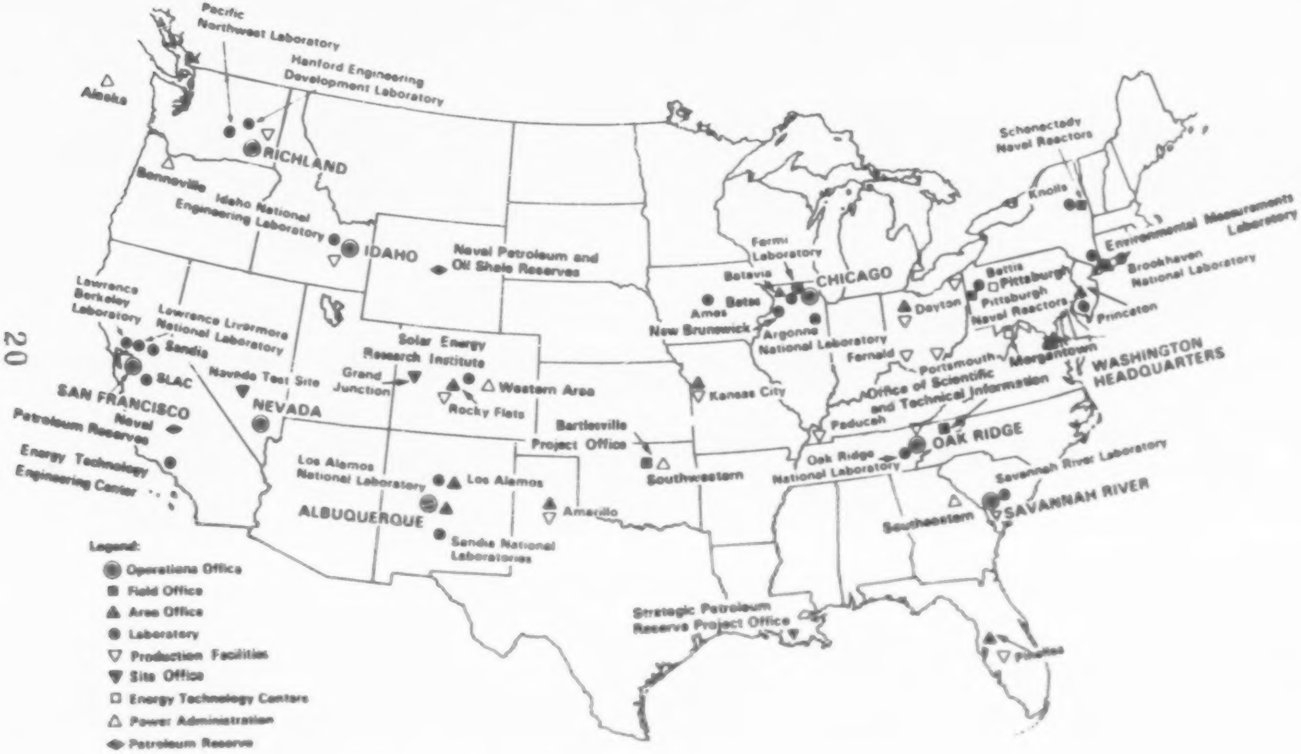
a/ Total estimated funding to support 100 FTE's in FY 85 is $6,000,000.
b/ Excludes 3 FTE's budgeted under the Nuclear Waste Fund in FY 85/86/87.
c/ Includes $7,617,000 for the Secretary's initiative in environment, safety and health, the Environmental Survey, and to help pay salaries and benefits of the additional Federal employees to manage and conduct this new program; funds transferred from other DOE programs.
d/ Includes $810,000 for personnel transferred to the consolidated ES&H office from AS/DP ($-325,000) and A/SNE ($-485,000).
e/ Excludes $700,000 that other DOE programs will issue to LLNL for ARAC support

DOE FIELD FACILITIES AND OPERATIONS


Pacific Northwest Laboratory
Hanford Engineering Development Laboratory
Alaska
RICHLAND
Bonneville
Idaho National Engineering Laboratory
IDAHO
Naval Petroleum and Oil Shale Reserves
Lawrence Berkeley Laboratory
Lawrence Livermore National Laboratory
Sandia
SLAC
SAN FRANCISCO
Naval Petroleum Reserves
Energy Technology Engineering Center
Nevada Test Site
NEVADA
Solar Energy Research Institute
Grand Junction
Western Area
Rocky Flats
Los Alamos National Laboratory
Los Alamos
ALBUQUERQUE
Sandia National Laboratories
Amarillo
Bartlesville Project Office
Southwestern
Kansas City
Fermi Laboratory
Batavia
CHICAGO
Ames
Bates
New Brunswick
Argonne National Laboratory
Dayton
Fernald
Portsmouth
Office of Scientific and Technical Information
Paducah
Oak Ridge National Laboratory
OAK RIDGE
Bettis
Pittsburgh
Pittsburgh Naval Reactors
Morgantown
WASHINGTON HEADQUARTERS
Schenectady Naval Reactors
Knolls
Environmental Measurements Laboratory
Brookhaven National Laboratory
Princeton
Savannah River Laboratory
SAVANNAH RIVER
Southeastern
Strategic Petroleum Reserve Project Office
Pinellas
Legend:
● Operations Office
■ Field Office
▲ Area Office
● Laboratory
▽ Production Facilities
▼ Site Office
□ Energy Technology Centers
△ Power Administration
◆ Petroleum Reserve

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
Environment, Safety and Health
(Dollars in thousands)

FY 1986 Adjusted Appropriation $46,921

Program increases and decreases:

o Nuclear Safety

-- perform extensive safety reviews of DOE operating facilities including technical appraisals of a number of high hazard nuclear facilities.................................+309

o Environmental Audit and Compliance

-- Perform Environmental Survey/site sampling at 20 DOE sites; analyze data and prioritize corrective/remedial action required, and support incorporation of funding for corrective actions in the FY 1989 and future years program budgets .... +26,500

o Operational Safety, Quality Assurance, and Environmental Guidance and Analysis

-- Continue FY 1986 activities .... -67

o Program Direction

-- increase contractual support, and travel for the environment, safety and health staff to provide a strong environmental protection and safety capability within the Department. Includes two additional FTE's...+1,778

o Capital Equipment

-- purchase of computer peripheral equipment to implement a computer assisted information tracking system; replace and upgrade aging equipment at the remote sensing laboratory and its five radiological emergency response aircraft; and purchase air monitoring and other testing equipment for radiation measurement standardization to support the improvement of occupational worker protection .... +657

FY 1987 Budget request... $76,098

1. Nuclear Safety - FY 1987 Request $17,225,000

The goal of the nuclear safety program is to assure the safe operation of DOE's nuclear facilities. In pursuit of this the nuclear safety program historically performed an independent safety overview of the Department's nuclear operations, which include 73 nuclear reactors and criticality facilities and approximately over 200 other diverse and highly technical nuclear process facilities, with a replacement value in excess of 70 billion dollars. This independent overview covers the safe operation of all nuclear facilities, protection of workers, the public, and property from adverse affects arising from the operation of DOE nuclear facilities, and associated emergency response resources. It has relied upon policy setting, training, providing technical assistance and guidance to DOE field offices and the performance of appraisals, predominantly of DOE management performance, to assure the proper adherence to sound operating principles. In FY 87 these essential activities will be maintained at a reduced level. Reviews of Safety Analysis Reports on DOE facilities will be conducted.

The Technical Safety Appraisals of DOE's operating facilities, a Secretarial initiative begun in FY 1986, will continue in FY 1987. These multi-disciplinary appraisals of DOE's high and moderate hazard facilities will be completed by the end of calendar year 1988.

To accomplish these augmented objectives the independent nuclear safety program is being upgraded through provision of staff.

The Nuclear Safety program is implemented through two major activities: Nuclear Facility Safety, and Radiological Controls.

	FY 1986 Adjusted Approp.	FY 1987 Base	FY 1987 Request
	($'s in thousands)		
a. Nuclear Facility Safety	$ 5,780	$ 5,780	$ 7,050
b. Radiological Controls	11,136	11,136	10,175
Total Nuclear Safety	$16,916	$16,916	$17,225

1a. Nuclear Facility Safety - FY 1987 Request $7,050,000

Introduction and Background

The Nuclear Facility Safety Activity is a focused effort to:

o The Technical Safety Appraisals of DOE's high and moderate hazard nuclear facilities, a Secretarial initiative begun in FY 1986, will continue in FY 1987. The objective of these appraisals is to assure the proper application of DOE's safety requirements, nuclear industry lessons-learned, and appropriate licensed facility requirements to DOE's nuclear facilities. They will provide a detailed "hands on" review of all aspects of a nuclear facility's operation, including such areas as reactor safety, process facility safety, criticality safety, health physics, emergency preparedness, quality assurance, operator training, maintenance, industrial hygiene, occupational safety, fire protection, and transportation and packaging safety. In the three-year period starting in FY 1986, approximately 50 of the Department's Category A reactors high hazard nuclear process facilities, and selected moderate hazard nuclear facilities will be appraised in this effort.

- Develop Departmental policy, standards, and requirements to be followed by all line organizations and operations offices to assure adequate safety of nuclear operations. To accomplish this effort an expert Federal staff, strengthened by technical specialists from the laboratories and other contractors, is required. The Federal workforce conducts appraisals, develops policy, participates in reviews of safety documentation, and manages the outlay projects. The outlay program includes activities that will maintain standards and related guidelines, provide for the most effective review and analysis of the Nuclear Regulatory Commission (NRC) and industry licensing requirements and operating experience, maintain nuclear facility operator training support activities, and provide safety technology to upgrade the design and operations of DOE's very diverse nuclear facilities.

- Conduct an independent overview of the quality and effectiveness of the Department's nuclear safety programs, which in FY 87 will include: formal appraisals of line management performance to assure consistent implementation of the Department's nuclear safety policies; in-depth technical appraisals of the safety of major operating nuclear facilities; reviews and analyses of safety analysis reports and of unusual occurrence reports; analyses of facility operational performance; and the review of Nuclear Regulatory Commission regulations and guidance to determine their applicability to the Department's nuclear operations.

- Develop and promulgate general minimum qualification and training guidance for personnel responsible for the management and operation of Department-owned nuclear facilities.

- Implement a coordinated approach to the development of nuclear criticality safety technology and guidance for applying the technology to operation of the Department's reactors and nuclear process facilities.

- Conduct generic safety studies of Departmental facilities and operations which provide a base for the development of policy, standards, and guidance to strengthen Departmental nuclear safety programs.

FY 1987 Request: $7,050,000

The FY 1987 budget request for nuclear facility safety of $7,050,000 is a $1,270,000 increase over the amount budgeted in FY 1986. The activities in support of this budget request are described below.

Development and interpretation of policy, standards and guidance for the safety of operations at nuclear facilities will continue, including analysis of emerging nuclear-related safety and health issues, important to a wide variety of DOE's nuclear operations. This includes a continuation of the nuclear safety technical assistance provided by eminent experts in various fields of nuclear safety technology from industry, universities, and laboratories to support DOE's reviews of safety issues, appraisals of field and contractor operations and other specialized technical needs. Other generic projects include a continuation of DOE-wide support in the design criteria for response to natural phenomena such as earthquakes, winds and floods and a continuation of the general application of probabilistic risk assessment methods to the safety analysis of nuclear facilities.

Improvements in the content of training programs for reactor operations and nuclear facility personnel will be continued. Training program activities will include: (a) development of training program and evaluation criteria for nonreactor nuclear facilities and guidance for structured on-the-job training programs; (b) coordinated exchange, consolidation and sharing of related training materials and methods among reactor and nonreactor nuclear facility operating contractors to improve cost-effectiveness and overall quality of training programs Department-wide; and (c) development of text material and lesson plans to support the Performance Based Reactor Operator Fundamental guides prepared in previous years. In addition, training courses for DOE and contractor staff in criticality safety and lessons learned from various DOE safety experiences will be continued.

Continuing improvements in nuclear criticality safety are needed if the Department is to continue to meet its responsibility for the safety of its workers and protection of its programs. A criticality accident would have a severe impact on DOE's expanding nuclear weapons and related activities and would indirectly impact the licensed industry. Between 1958 and 1962, the Department's operations experienced five criticality accidents with one fatality and some severe radiation exposures to workers. In response to these accidents, criticality safety was improved, and better techniques for criticality control were developed. The natural consequence was a better safety record for a few years. However, a major criticality accident in 1978 shut down a key facility for 2 years even though there were no radiation overexposures. Also, over the years few improvements had been made, reference documents had not been updated to incorporate more accurate data, and a coordinated approach to criticality safety technology was lacking. In order to improve this situation, the Office of Nuclear Safety started a nuclear criticality safety effort in FY 1985 in such areas as (1) physics of criticality, (2) computational capability, (3) communications and information, and (4) knowledge of factors affecting criticality. In FY1987, efforts will continue in the areas of dissemination of criticality safety information, maintennance of calculational capabilities, and improvements of the understanding of physics of criticality. Updating of base technical documents will be continued. Continued maintenance of nuclear criticality safety is important to the Department's defense and nuclear energy missions.

Efforts to evaluate current and evolving nuclear safety criteria and operating experiences at licensed facilities will continue to assure that all actions being taken to enhance the safety of licensed nuclear facilities are considered for their applicability to the Department's reactors. Independent technical experts from universities and industry will continue to be made available to support Nuclear Safety activities, including a continued support to program and field offices in performing specific safety reviews. In FY 1987, minimal programs in the area of human factors applications to the design and safe operation of reactors and nuclear facilities and in the screening for potential application of licensed reactor criteria and experiences to DOE reactors will be maintained. Seminars on safety experiences from past nuclear facility operations will be continued, as will the technical training seminars in selected emerging safety technologies.

Other improvements in nuclear process facility safety will also continue in 1987 as part of the Department's efforts to improve safety of its nuclear operations. For example, development of computer programs to analyze the effects of explosions in ventilation systems will be completed.

In addition to the performance of the above continuing efforts, the Office of Nuclear Safety will intensify the performance of technical appraisals of high and selected moderate hazard nuclear facilities in order to provide a more uniform and direct evaluation of the safety of the operation of such facilities. Utilizing standard performance objectives and criteria that are results oriented, such evaluations will focus on facility operations, maintenance, technical support, training, radiological protection including effluent control and emergency preparedness. These technical appraisals will provide a more direct evaluation of the safety of the operation of such facilities by assuring DOE-wide consistency in the application of DOE requirements, application of nuclear industry lessons-learned, and application of appropriate licensed nuclear facility requirements. Consultants and Federal employees will be used to provide the needed technical expertise in the required disciplines for these technical appraisals.

There will be increased involvement in the nuclear facility operations authorization process through the independent review and concurrence of reactor and nonreactor nuclear facility safety analysis reports for new facilities and facilities undergoing significant modifications. This will be accomplished through a greater number of safety analysis report reviews for new facilities and facilities undergoing significant modifications. These reviews focus on the technical aspects of the safety analysis report and form the basis for concurrence on these risk-related actions. Consultants and Federal employees will be used to provide the needed experts in the required nuclear disciplines for these reviews.

1b. Radiological Controls - FY 1987 Request $10,175,000

Introduction and Background

The Radiological Controls activity provides a balanced effort to:

- o Provide management and policy direction to Department-wide radiation protection programs to meet the demands of the 1980's arising from changes in recommendations and regulations and new emerging technologies. Provision is made for technical assistance through direct staff support.

- o Maintain state-of-the-art capabilities to provide for occupational radiation worker protection through advances in measurement and calibration technology, operational health physics design and assessment and accreditation.

- o Conduct independent overview and appraisals using the Federal workforce to achieve consistent and validated radiation protection and emergency preparedness at all Department-controlled facilities.

- o Provide technical emergency preparedness assistance, including planning and accident response capability to field offices in responding to radiological problems and emergencies.

- o Provide leadership, as requested, on interagency, national and international standards committees dealing with radiation guidance. Radiation protection codes, guides, standards and procedures are developed for use by DOE field operations. The policy is formulated by the Federal workforce using data and information obtained from supporting outlay projects. Through the appraisal program, the effectiveness of their field-level implementation is assessed and, as appropriate, included in modifications or formulations of DOE radiation protection policies. At the same time, close interaction is maintained with national and international radiation standards development bodies both to provide these groups with the wide spectrum of DOE experience in occupational radiation protection and to monitor technological and operational developments for possible application to the Department.

Emergency response activities provide resources to monitor and assess any accidental release of radioactivity from a nuclear facility. Aircraft are maintained to be ready to employ state-of-the-art remote sensing equipment to rapidly map large areas which may have been affected by an accidental release. A computer-based system, called the Atmospheric Release Advisory Capability (ARAC), provides a radiation exposure prediction capability in the event of an accidental release. This system uses actual weather and terrain to predict on a regional scale the transport, diffusion, and deposition of any radioactivity released to the environment. Complementing these resources is an experienced cadre of scientists, engineers and technicians who are always available to assist local authorities and to coordinate DOE, DOD, and other Federal responses to an accident.

FY 1987 Request: $10,175,000

The FY 1987 budget request for Radiological Controls is $10,175,000, a $961,000 decrease below the amount budgeted in FY 1986. The activities are discussed below.

Enhanced measurement sensitivity for measuring the levels of radiation that workers are exposed to is necessary to implement anticipated changes in the basic Federal radiation protection guidance by EPA, increased dose estimations for neutrons and x-rays arising from changes in quality values, and preparation for technological changes in DOE nuclear materials production.

Continuing efforts will be specifically directed to improvements in external and internal dose assessment, including characterization of radiation fields at DOE facilities, calibration and accreditation. In response to changes in radiation protection arising from the new EPA occupational exposure guidance, guidance for summing internal and external exposures will be developed. Efforts will be initiated to correlate measurements to actual risk in order to strengthen the DOE position regarding litigation and to analyze long term impact of DOE exposure control and ALARA policy.

Concurrent with substantial improvements in measurement capabilities and technology, improvements to radiation record systems will also be developed and implemented. While improvements to the quality of the records will be a goal, uniformity of records between sites will also be a prime objective.

The Department's emergency response capability will be maintained in a state-of-readiness by means of both the Aerial Measurements System (AMS) and ARAC. Radiometric surveys of major nuclear installations in the U.S. will continue in order to provide the essential baseline for determining the consequences of any radiological accident. The ARAC will continue its readiness to provide computer-generated predictions of dispersal of radioactive material during an emergency, and will participate in emergency exercises and drills. Plans will continue (begun in FY 1985) to mesh the ARAC system together with NRC's assessment system, for use during an emergency at a licensed nuclear power plant. One simulated demonstration of the emergency response capability is planned. This will utilize the radiological assistance capability of a field office that will be the host. This would demonstrate the Department's ability to manage a major radiological accident on a regional basis. The radiological assistance capability will be maintained. This activity represents a regional response capability, providing monitoring and equipment as required in the case of a radiological accident.

Federal Personnel - Office of Nuclear Safety

	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request
Total FTE	37	37	37

Federal Personnel

The Department's Action Plan on nuclear safety after the TMI accident called for a reassessment of staffing levels needed to adequately discharge the Department's nuclear safety responsibilities associated with its nuclear operations, and for internal adjustments as indicated by that assessment. A formal, comprehensive study was made in FY 1982, and updated in 1984, to determine the nuclear safety manpower required for all Departmental elements. For the activities assigned to the Office of Nuclear Safety, a significant increase in FTEs was found to be needed. Since the Department's nuclear safety programs continue to expand, the staffing requirements determined by the study are considered to be an important benchmark. Maximum use is made of contractor technical support.

A trained and experienced staff is essential to fulfilling the mandate and responsibilities of the Office. The safety and health specialties that are represented in the staff are nuclear physics and engineering, nuclear operations, nuclear criticality, nuclear process control, radiological protection, and emergency response planning and testing. In addition to developing Departmental policy, standards and requirements, and interpreting these policies, the staff appraises the adequacy of the implementation of these policies and requirements by DOE's line organizations, provides expert technical advice and analyses to all DOE organizational elements, and performs technical evaluations of the adequacy of current and planned DOE operations to: protect the safety and health of workers and the public; protect the environment; and protect Government property from accidental loss or damage. The staff also manages the contracts which supports these activities.

To more directly evaluate safety of operating facilities Office of Nuclear Safety staff will conduct technical appraisals of DOE high hazard nuclear facilities, concur in safety approval actions on reactors and high hazard nuclear facilities, and conduct HQ independent review of reactor and nonreactor nuclear facility safety analysis reports. Technical appraisals will provide a more direct evaluation of the safety of the operation of such facilities by assuring DOE-wide consistency in the application of DOE requirements, application of nuclear industry lessons-learned, and application of appropriate licensed nuclear facility requirements. Independent review of facility safety analysis reports will determine whether the risks presented by the facility operation are accurately represented and whether the risk is reasonable.

Involvement in the nuclear facility operations authorization process will be significantly increased through a greater number of safety analysis report reviews for new facilities and facilities undergoing significant modifications. These reviews focus on the technical aspects of the safety analysis report and form the basis for EH concurrence on these risk approval actions. Current projections indicate that EH will be required to take concurrence actions on approximately sixteen approval requests per year.

Maximum use of contract support will be made in the performance of technical appraisals and the review of Safety Analysis Reports.

2. Quality Assurance - FY 1987 Request $800,000

Introduction and Background

The Quality Assurance Program assures that the Departmental policies and activities governing quality assurance are adequate to meet the needs of the missions and objectives of the Department. This Program develops Departmental quality assurance policies and standards and conducts independent overview, appraisals, and support activities to assure and to assist in their implementation.

Quality assurance is a system of management controls and procedures applied to programs to assure that output - whether product, data, processes or services - conforms to requirements established by management. Quality assurance has been applied systematically in the aerospace and nuclear industries for years as a means to assure safety and reliability of systems. More recently, management programs to improve quality are being pursued to achieve other important dividends including dollar savings, customer satisfaction, and higher productivity. In the DOE, the quality assurance policy is intended to assure that its programs achieve a high degree of operational success with due consideration to performance, reliability, health, safety and environmental protection concerns.

FY 1987 Request: $800,000

The FY 1987 budget request for Quality Assurance (QA) is $800,000, a $114,000 decrease below the amount budgeted for FY 1986. The request includes funds for contractor services to support 1) independent quality assurance appraisals of DOE activities, 2) the maintenance of the unusual occurrence reporting system (somewhat analagous to the NRC's Licensee Event Reports), and 3) the Department's standards program.

As part of the overall plan to strengthen the Department's safety and environmental activity, the Department has centralized the Headquarters quality assurance function to provide a strong institutional organization that will serve as a focal point for quality assurance policy development, leadership, technical support, and verification of quality objectives. A primary responsibility assigned to QA is to conduct independent quality assurance overview and management appraisals of DOE programs. The appraisal activity includes: management appraisals of the quality assurance programs of the line-management offices, technical appraisals of selected nuclear facilities, and appraisals of contractor facilities and operations. Contract support is utilized to supplement available Federal staff expertise in specialized areas where it would be inefficient to maintain a particular expertise on a regular basis.

Federal Personnel - Office of Quality Assurance

	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request
Total FTE	8	8	8

The activity of QA comprises eight staff-years of Federal effort. About six person-years of effort are provided through procurement of contractor services. This distribution of resources applied to the activities of QA is based on several operational considerations such as policy development and overview, appraisals, and the necessary direct communications and technical assistance within the DOE quality assurance community.

3. Operational Safety Program FY 1987 Request $3,900,000

The Operational Safety Program has Departmental responsibility for providing oversight of all DOE Government-owned, Contractor-operated facilities to assure that DOE contractor employees at these facilities are protected against occupational hazards and are provided with a safety and healthful workplace; that the public, public property, and DOE property are protected against the hazards that may result from the operation of these facilities; and that applicable Federal, State and local laws and requirements are complied with. The Program also assures that DOE safety and health responsibilities in areas specifically exempt from other Federal legislation, such as the Occupational Safety and Health Act and Federal Aviation Administration requirements, receive Department-level oversight. The scope of the program includes occupational medicine, industrial hygiene, occupational safety, explosives safety, systems safety, hazardous materials packaging and transportation safety, non-nuclear facilities safety, aviation safety, fire protection, safety analysis and review system, and the safety and health performance measurements system. The Program is responsible for developing safety and health policies and requirements, conducting evaluations and appraisals, and providing technical advice, support, and assistance to Headquarters and field organizations, to assure adherence to those policies and requirements.

The program is comprised of two major activities:

- Safety and Health Performance Measurement
- Safety and Health Protection

	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request
	($'s in thousands)		
a. S&H Performance Measurement	$ 1,685	$ 1,685	$ 1,550
b. Safety & Health Protection	2,688	2,688	2,350
Total Operational Safety	$ 4,373	$ 4,373	$ 3,900

3a. S&H Performance Measurement FY 1987 Request $1,550,000

Introduction and Background

The objective of this activity is to collect, analyze, and disseminate information related to S&H performance at Field organizations and within the DOE program offices for use by Field organization and Headquarters management and the public. This information provides feedback on the adequacy of the S&H programs and is used for resource allocation and risk assessment and to develop and teach advanced system safety techniques and methodologies for field application, with the ultimate goal to reduce S&H risks in DOE operations.

1987 Request: $1,550,000

The FY 1987 budget request for S&H Performance Measurements is $1,550,000, which is a $135,000 decrease below that budgetet for FY 1986. The requested level of funding will permit operation of all seven modules of the DOE S&H Performance Measurement System, providing the Department with the capability to make selected comprehensive analyses of its safety, and health program.

The requested level of funding also will permit a continued strong program of workshops and seminars to provide approximately 3,000 student-days of instruction in advanced system safety methodologies.

3b. Safety and Health Protection FY 1987 Request $2,350,000

Introduction And Background

The objective of this activity is to assure the safety and health of the public, to protect Government properties against accidental loss and damage, and to assure safe and healthful work places and conditions of employment for both DOE and contractor employees at approximately 225 industrial and research sites involving both nuclear and non-nuclear operations with a replacement cost of over $90 billion across the United States. Emphasis is on aviation safety, transportation packaging safety, fire protection, explosives safety, Safety Analysis and Review System, industrial safety, occupational medicine, and industrial hygiene. Through this activity, the Safety and Health policies, standards, and requirements are developed for the Department, independent appraisals of the program offices and field operations are conducted, and technical guidance and interpretation of policies and DOE Orders are provided. Results of appraisals are provided to DOE senior management as an integral part of the ES&H assurance system. Through this activity the Department is provided an effective occupational safety and health program that is consistently better than that of comparable private sector organizations.

The new direction of safeguards and security activities in the Department requires increased support and assistance in the development of safe, effective security force operations. The security aircraft operations have generated a 25,000 labor-hour per year increase in risk to employees engaged in the more hazardous security aircraft operation. Aviation safety efforts are focused on the operation of about 45 DOE-owned aircraft for daily use, and the charter of an additional 15 to 20 aircraft on a frequent basis.

FY 1987 Request: $2,350,000

The FY 1987 budget request for Safety and Health Protection is $2,350,000, a $238,000 decrease below the amount budgeted in FY 1986. The requested funds will enable the basic functions to continue, with emphasis in the following areas:

- Develop a standard human reliability program for all DOE contractor medical departments, instead of the independent and diverse development now underway.

- Complete medical standards for all sensitive positions, and rewriting of all Orders pertaining to contractor Occupational Medical departments.

- Continue the Toxic Material Advisory Program to provide toxicity data and exposure guidelines upon request. The industrial hygiene task force activities will emphasize implementation of new engineering methods for controlling occupational exposure to toxic chemicals; and the respirator studies program will continue to test special DOE developed equipment and provide guidance to all DOE contractors on all aspects of respirator use.

- Continue fire protection surveys at the Strategic Petroleum Reserve, Lawrence Livermore National Laboratory, and Gaseous Diffusion plants.

- Continue the high explosive safety training program; continue the Explosive Safety Information Data System; and develop guidance procedures for assessing risk in explosives operations.

- Continue efforts on fire risks in control rooms and the influence of fire on ventilation systems, and initiate new study on efficacy of loaded HEPA filters under fire attack.

- Conduct six appraisals of aviation safety operating contractors and hold a workshop for field organization safety personnel with aviation overview representatives, continue to evaluate procedural operating documents for field offices.

- Continue the Safety Analysis Review System (SARS) program, provide technical assistance to field and program elements and conduct SARS program appraisals.

Federal Personnel - Office of Operational Safety

	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request
Operational Safety FTE's	22	22	22

The principal objective of Operational Safety is to assure a continuing high level of performance of S&H activities at DOE facilities. The following essential disciplines are represented by the Operational Safety staff: occupational medicine, industrial hygiene, explosives safety, safety data analysis, fire protection, aviation safety, and occupational safety. In addition to developing S&H policy, standards, and requirements, interpreting these policies for field operations, and overviewing the implementation of these policies, the staff manages technical projects in support of these activities.

The ability of the Operational Safety program to maintain and improve upon the high level of performance for safety and health protection throughout DOE depends primarily on the availability of skilled technical staff at DOE Headquarters to work with DOE field and program offices. To continue to provide effective services to the Department in assuring and continuing a high level of performance in S&H activities and to enhance the safety overview and assurance of all operations, a competent and adequate federal technical staff is required.

4. Environmental Audit and Compliance - FY 1987 Request $34,000,000

Introduction and Background

The Environmental Audit and Compliance Program was initiated in FY 1986 as a principal element of the Secretary's plan to strengthen the Department's Environment, Safety and Health Programs. The goal of the Program is to ensure that the Department's operating facilities are in compliance with all applicable environmental requirements and to reduce areas of existing environmental risk. This is accomplished through a number of activities which include: a one-time baseline Environmental Survey of all DOE operating facilities followed by a continuing program of regular environmental audits of all operating facilities; a continuing process of evaluating compliance needs and establishing budget priorities DOE-wide; evaluations and recommendations concerning the selection of corrective measures; and continuous tracking and monitoring of compliance progress from initial identification of needed corrective measures through completion and operation of such measures. In addition, the Program provides technical assistance and support to program and field offices in the design and implementation of corrective measures. The Program also serves as liaison with Federal and state agencies in the resolution of compliance issues concerning operating facilities, including site-specific problems related to corrective measures.

FY 1987 Request $34,000,000

The FY 1987 budget request for the Environmental Audit and Compliance Program is $34,000,000, which is $29,500,000 above the FY 1986 level. The principal activities of the Environmental Audit and Compliance Program in FY 1987 will be the continuation of the Environmental Survey and ongoing support and oversight functions.

The purpose of the one-time baseline Environmental Survey, which was initiated in FY 1986 and which is expected to be completed in late FY 1988 or early FY 1989, is to identify and prioritize areas of existing environmental concern and risk DOE-wide. The results of the Survey will enable the Department to develop, on a uniform basis, comprehensive, long-range planning for correcting environmental problems and reducing environmental risks. During FY 1987, the baseline survey for approximately 20 DOE sites will be completed.

The Survey Program covers all media, i.e., air, water, and soil, and all areas of environmental regulation, e.g., the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Response, Compensation, and Liability Act. The Survey Program also covers all DOE programs and major operating facilities and involves a baseline survey of approximately 40 DOE sites at which there are an estimated 600 inactive waste areas, 300 hazardous waste management areas, 1500 air emission stacks, and 400 wastewater outfall pipes.

The environmental baseline survey of a site is conducted by a multi-disciplinary team of specialists headed by DOE ES&H personnel. There are 5 survey teams with 7 to 13 members on each core team. The core teams are supplemented, for sites with a large number of inactive waste disposal areas by additional 2 or 3-member components specialized in the assessment of such areas. The team leader and assistant leader for each team are Federal ES&H employees, who are supported by technical experts from the National Laboratories and contractors.

A major cost component of the baseline survey is preliminary sampling and analysis sufficient to determine the existence and seriousness of environmental problems at DOE sites. Most of the preliminary sampling and analysis activity is directed at the Department's inactive waste disposal areas.

The results of the baseline survey, including sampling and analysis, are evaluated for purposes of identifying environmental compliance needs, assessing risk, establishing annual budget priorities, and developing a long-range plan for correcting problems and reducing environmental risks on a DOE-wide basis. After completion of the Environmental Survey, the program will conduct regular environmental audits which will cover all DOE facilities on an ongoing basis to monitor the progress of necessary corrective actions, to ensure compliance with environmental laws and regulations, and to evaluate field office practices and procedures.

During FY 1987, the Environmental Audit and Compliance Program will also perform a range of continuing support and oversight functions, including: technical support and assistance in resolving problems associated with environmental permitting; technical reviews of environmental control and remedial action projects; coordination of the resolution of Department-wide environmental compliance issues; and preparation of statutorily mandated Departmental reports such as the Federal Facilities Inventory Report required under Section 3016 of RCRA.

Federal Personnel - Environmental Audit and Compliance

	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request
Total FTE's	18	18	25

The responsibilities of the Office of Environmental Audit and Compliance, including the Environmental Survey, the continuing program of environmental audits, field liaison for compliance, and support and oversight functions, involve policy interpretations and other activities that can only be performed by agency staff. The staffing level requested would provide the minimum number of agency staff required to fulfill these responsibilities.

In addition to conducting the Survey and, subsequently, the environmental audits, the staff manages the contracts that support these activities, and performs a number of support and oversight functions including:

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Conference	General Reduction	FTE General Reduction	Gramm-Rudman-Hollings Reduction	ESAA Transfer/ Reprogramming	Subtotal	Comparability Adjustments	Adj. Approp. Total
Environment, Safety and Health								
Operating Expenses	$38,865	$ -47	$ -13	$-1,467	$ 7,617	$44,955	$ 523	$45,478
Capital Equipment	1,300	---	---	-57	---	1,243	---	1,243
Subtotal, Environment, Safety and Health	$40,165	$ -47	$ -13	$-1,524	$ 7,617	$46,198	$ 523	$46,721
General Reduction: Operating Expenses	-47	47	---	---	---	---	---	---
FTE Reduction	-13	---	13	---	---	---	---	---
Total, Environment, Safety and Health	$40,105	$ ---	$ ---	$-1,524	$ 7,617	$46,198	$ 523	$46,721
Operating Expenses	$38,805	$ ---	$ ---	$-1,467	$ 7,617	$44,955	$ 523	$45,478
Capital Equipment	1,300	---	---	-57	---	1,243	---	1,243

- Providing technical assistance and support to Departmental program and field offices in designing and implementing corrective actions;
- Participating on an ongoing basis in the prioritization of areas requiring corrective actions and projects to implement such corrective actions;
- Evaluating the adequacy and cost-effectiveness of alternative corrective actions;
- Making recommendations concerning the selection of corrective actions;
- Providing support to the field on environmental issues, such as permitting for waste management;
- Reviewing environmental permits and resolving environmental compliance issues;
- Providing liaison for field offices in their dealings with other Federal and state agencies on environmental compliance issues;
- Preparing statutorily mandated reports, e.g., Inventory of Federal Facilities under Section 3016 of RCRA, and the A-106 Pollution Abatement Report;
- Providing recommendations to the Office of Environmental Guidance in the development of guidance, standards, and directives on environmental matters; and
- In coordination with the Office of Environmental Guidance, providing environmental training opportunities to keep DOE personnel informed on environmental compliance requirements.

5. Environmental Guidance - FY 1987 Request $3,900,000

Introduction and Background

The Environmental Guidance Program was strengthened in FY 1986 as part of the Secretary's plan to improve the environment, safety, and health functions within the Department of Energy. The program represents the integration and enhancement of functions previously performed by the former environmental compliance and environmental protection elements.

The overall mission of the program is to assure DOE-wide understanding and implementation of environmental laws and regulations applicable to DOE projects and operations. The mission is fulfilled through the development of compliance policies and generic guidance documents, standards, and internal DOE orders, which cover the full range of environmental statutes and regulations. The Office also keeps DOE personnel abreast of emerging and changing environmental requirements and serves as the advocate for DOE's position with respect to other agencies' rulemaking efforts. In addition, the Office maintains its NEPA assurance functions, including independent NEPA review activities.

Consistent with the Secretarial decision to strengthen the environmental, safety, and health functions, the program will play a more active role in the development and coordination of Department comments on emerging environmental statutes, rules, and other Federal agency policies that could impact DOE. To accomplish this element of the program mission, EH will utilize the Department's regualtion review and coordination system. The system was designed to keep DOE personnel abreast of emerging and changing environmental regulations which may have an impact on the Department's activities, and is used to identify regulations which could have serious implications for the Department, monitor the progress of rulemakings to assure that those regulations affecting the Department are not overlooked, and to provide a mechanism for the Department to prepare a unified regulatory reponse to other Federal agencies which would protect the Department's interests from unduly restrictive and costly environmental requirements.

The environmental guidance element will provide greater and more detailed policy guidance to DOE field offices with respect ot the implementation of the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended.

Compliance with environmental requirements protects the environment and public health and is a prerequisite to the implementation of Departmental programs and projects. In addition to increased risks of harm to the public and environment, non-compliance or late compliance can result in needless, prolonged, and costly delays as a result of litigation or other reasons. Therefore, another important element of the mission is to protect DOE programs and projects from delays in implementation due to non-compliance with the National Environmental Policy Act (NEPA) and other environmental requirements that are necessary prior to project implementation. This NEPA assurance function is fulfilled through generic guidance as well as project specific assistance and independent review activities.

Examples of major environmental requirements applicable to the Department are provided below.

Major Environmental Requirements
Applicable to the Department of Energy

- The National Environmental Policy Act
- The Resource Conservation and Recovery Act
- The Clean Water Act
- The Endangered Species Act
- The Fish and Wildlife Coordination Act
- Hazardous Materials Transportation Act
- Safe Drinking Water Act
- Toxic Substances Control Act
- The National Historic Preservation Act
- The Comprehensive Environmental Response, Compensation, and Liability Act
- The Coastal Zone Management Act
- The Clean Air Act
- Executive Order 11988, Floodplain Management
- Executive Order 11990, Protection of Wetlands

FY 1987 Request: $3,900,000

The FY 1987 budget request for the Environmental Guidance program is a $277,000 increase over the amount budgeted in FY 1986. This request will enable the environmental guidance element to implement an environmental guidance program consistent with the Secretarial decision to strengthen the Department's environment, safety, and health functions.

The Guidance element will implement the Department's regulation review and coordination system to facilitate early identification of emerging environmental statutes, environmental regulations, and external environmental policies which may have effects on Departmental activities, and to pursue a framework under these activities which would be compatible with DOE actions. Efforts will be directed towards those regulations having the most potential impact on DOE facilities. Such items expected to be reviewed under the system in FY 1987 include: the Safe Drinking Water Act and the National Primary Drinking Water Standards; EPA Low-level radioactive waste standards; major RCRA regulations, procedures, and guidance; CERCLA regulations, procedures, and guidance; and standards for protection against radiation.

The Guidance element will also implement a program for assuring DOE-wide understanding and implementation of environmental requirements. The program will review internal environmental orders and standards to determine any need for revision, and revise those internal orders and standards as appropriate to be consistent with the new and enhanced organizational responsibilities of ES&H. Orders anticipated to be reviewed include the DOE order on RCRA, CERCLA, radiation protection standards, and environmental protection standards. The program will develop and provide to DOE program and Field offices comprehensive and detailed guidance on implementing recent initiatives in hazardous waste areas, such as the 1984 RCRA amendments and associated emerging regulations. In addition, the program will also develop policy and procedures to implement new DOE environmental programs. In addition, the Guidance element will provide for environmental training opportunities to inform and educate DOE personnel on environmental requirements and policies.

The program will also continue its NEPA activities on behalf of the Department. Based on identified projects and other initiatives, the FY 1987 workload is expected to include approximately 180-200 analyses of Department actions to determine/confirm the level of required NEPA documentation and to provide other early advice, and an estimated 140-160 independent reviews of NEPA and other environmental documentation to assure that standards of document adequacy are met.

The technical analyses performed by the guidance element in support of NEPA reviews, standards setting, and the development of DOE environmental policy positions on emerging regulations often entail complex scientific matters such as risk assessment, predictions of exposure levels due to airborne radionuclides, groundwater transport of radionuclides, and groundwater migration of hazardous waste. The contract funding requested will provide for specialized technical support for the Federal staff to ensure the scientific and analytical accuracy and objectivity of the Department's positions. Such technical support requires a breadth and depth of specialized skills in combinations which are otherwise not available to staff. The level of funding requested is commensurate with: the expected level of new project activity; the technical complexity of the environmental issues associated with these projects and the technical analyses required in developing regulatory responses to other agency rulemakings, having the most impact on DOE operations.

Federal Personnel - Office of Environmental Guidance

	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request
Total FTE's*	18	18	18

* Excludes 3 FTE's budgeted under the Nuclear Waste Fund.

The responsibilities of the Office of Environmental Guidance, which include the development of internal environmental orders, policies and standards, serving as the DOE advocate for policy positions on the rulemaking activities of other Federal agencies affecting DOE, providing environmental policy guidance and support for DOE facilities, the performance of NEPA oversight functions, and the analysis of environmental requirements and the development of DOE positions. Examples of the types of activities performed include:

- Preparing Departmental comments on emerging environmental statutes, regulations, and other agencies' policies that could impact DOE projects and operations;
- Developing written policies, standards, guidance, and Orders for assuring DOE-wide understanding and implementation of all applicable environmental laws and regulations;
- Providing comprehensive guidance with respect to the Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act, as amended.
- Analyzing proposed programs and projects and determining the required level of NEPA review, e.g., environmental assessment (EA), and environmental impact statement (EIS), early in the planning stage of a Departmental action to enable timely preparation of documents;
- Guiding and assisting Departmental offices in scoping the content of and preparing required EA's and EIS's to assure that the full range of environmental issues are adequately covered;
- Independently reviewing all Departmental EA's and EIS's and related environmental documents to assure that NEPA requirements are met;
- Providing guidance to DOE program and field offices on the requirements of NEPA and other environmental laws and regulations relevant to the NEPA process.

The development of these interpretations, policy positions, and other related activities can only be performed by agency staff. In addition, the staff manages the contracts which support these activities. A trained and experienced staff is therefore essential to fulfilling the responsibilities of the element and the level requested would provide the minimum number of agency staff required to fulfill those responsibilities.

6. Environmental Analysis - FY 1987 Request $2,700,000

Introduction and Background

The Environmental Analysis Program provides responsive analyses and options development with respect to significant environmental issues that affect national energy supply, demand and prices.

This mission is accomplished by the analysis and coordination of energy-related environmental issues to assure the full development and assessment of policy options in DOE decisions affecting U.S. energy systems and in the development of associated policies and programs.

A broad range of coordination and support activities are carried out by the office within and outside the Department. The Office maintains cognizance of the activities of other Federal agencies; the Members of Congress, Congressional committees and key Congressional staff; international groups that perform environmental studies and policy development, and private interests.

FY 1987 Request: $2,700,000

The FY 1987 budget request for Environmental Analysis is $2,700,000, a $243,000 increase above the level in the 1986 Congressional Budget Request. Analysis of the impact of proposed environmental regulations and laws on energy policies and the energy industry and continued base level support and participation in acid rain analyses will receive first priority. In this regard, many new environmental regulations (e.g., pursuant to Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation and Liability Act, Surface Mining Control and Reclamation Act, etc.) are being proposed or promulgated during FY 1987 which could have significant impact on the nation's energy supply operations. These include the ozone national ambient standard, the electric utility boiler new source performance standard, new standards for energy waste disposal, increased surface mining regulatory activity, a diverse set of nitrogen oxide emission reduction initiatives and hydrocarbon controls for vehicles. Staff have participated actively in the regulatory development process for several years and they have extensive knowledge of the scope and impact of new regulations and national energy systems. This program will continue to provide advice on efficient implementation strategies for national energy systems.

Information management programs will focus on data base maintenance for high-priority air, solid waste, and water quality parameters related to current and forthcoming regulatory actions. A second major assesment report on acid rain will be completed. An environmental analysis of the sixth National Energy Policy Plan will be done. Technical leadership for international environmental issue such as global climate change and trans-boundary pollution will be maintained.

Federal Personnel - Office of Environmental Analysis

FY 1986 Appropriation	FY 1987 Base	FY 1987 Request
8	8	8

Federal personnel requested for the operation of this program serve as the analytical staff to EH on issues relating to energy/environmental policy, environmental regulatory impacts on the energy supply industry, acid rain issues, and other related areas. The current staff level provides an informed, rapid response to major program and policy issues as they develop and insures adequate staffing of interagency and international work groups and task forces on a wide range of topics, including acid rain and transboundary pollution. The staff uses contractors to assist in providing the analyses of energy/environmental issues required to develop a Departmental position and/or to evaluate multiple cost, benefit, and effectiveness criteria related to the impacts of new program direction and regulatory proposals.

7. Program Direction FY 1987 Request $11,473,000

	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request
	($'s in thousands)		
Funding; ES&H..............	$9,695	$10,094	$11,473
(Policy and Management)....	(481)	(505)	(685)
Staffing			
Total FTE's a/	125	125	127

a/ Excludes 3 FTE's budgeted under the Nuclear Waste Fund.

FY 1987 Request: $11,473,000

The FY 1987 budget request is $11,473,000 which is an increase of $1,379,000 above the amount budgeted for FY 1986. This request also provides executive direction, management assistance, and administrative support to all programs of the Office of Assistant Secretary for Environment, Safety, and Health. The resources in this request support the Assistant Secretary and budget and administration functions including maintenance of the computer assisted tracking system containing environmental and safety information and data on all DOE facilities.

As part of the Secretary's plan to strengthen the environment, safety and health program within the Department, the development of a DOE-wide Field Reporting and Computer Assisted Tracking System was initiated in FY 1986. The system, which will be completed and implemented in FY 1987, is an essential management tool for the Environmental Audit and Compliance Program, the Nuclear Safety Program, and the Operational Safety Program.

The system will contain comprehensive environmental and safety information for major DOE sites including: the baseline information and recommendations for corrective action developed by the Environmental Survey and the Technical Appraisals, which are also elements of the Secretary's plan; regular appraisal and audit information; field office environmental and safety incident reporting; regulatory agency permit requirements and actions; and, statutory and regulatory deadlines or compliance schedules.

The system will be used to manage and access this very large volume of information for purposes of: determining and monitoring the environmental and safety compliance status of DOE's operating facilities; establishing priorities among compliance needs DOE-wide; developing a long-range plan for correcting problems; monitoring progress in implementing corrective measures; and, fulfilling Congressionally mandated reporting requirements.

Summary of Personnel Compensation

	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request
	($'s in thousands)		
Full-time permanent salaries	$6,750	$7,100	$ 7,550
Personnel benefits	788	837	900
Other services	250	250	300
Contractual services	1,057	1,057	1,723
Travel & transportation of persons	850	850	1,000
Total	$9,695	$10,094	$11,473

The budget request for 127 staff years provides a minimum staff to accomplish the Federal staff responsibilities in assuring protection of the environment, safety of the workers and the public, and protection of the property of DOE. This level of staff will be able to provide for extensive, in-depth reviews of DOE facilities and direct assurance of conformance to environmental protection and safety standards. To conduct the Environment, Safety and Health Program, Federal staff are required to provide effective services to the Department in assuring and continuing a high level of performance in ES&H activities. Adequate Federal Headquarters personnel, trained and experienced in ES&H affairs is the most essential ingredient for this program. It is the policy of the Department that policy development and oversight functions be performed only by Federal employees.

The request includes an increase of 2 FTE's, above the FY 1986 adjustment appropriation. The increase in the FY 1987 request is for contractual support for the new Secretarial initiatives, including increased travel and personnel costs.

Summary of Federal Manpower
(In FTE's)

	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request
Nuclear Safety	37	37	37
Quality Assurance	8	8	8
Operational Safety	22	22	22
Environmental Audit and Compliance..	18	18	20
Environmental Guidance	18	18	18
Environmental Analysis	8	8	8
Policy & Management	14	14	14
Total FTE's	125	125	127

The federal staff requirements and increase is justified in the program area narrative.

8. Capital Equipment - FY 1987 Request $2,100,000

	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request
	($'s in thousands)		
Capital Equipment	$1,443	$1,443	$2,100

FY 1987 Request $2,100,000

The FY 1987 Departmental request for capital equipment is $2,100,000 for the Environment, Safety and Health (ES&H) program and represents a $657,000 increase over the FY 1986 budget level. This equipment funding is in support of the ES&H programs' operating activities conducted at 7 national laboratories and 16 dedicated Department-wide contractors. A wide variety of capital equipment is required to pursue the diverse program of emergency response, research, and assessment of environment, safety, and health impacts of energy production, research and development. The variety and complexity of research conducted requires specialized and sophisticated equipment, and the necessity to maintain state-of-the-art capability to support the research and assessment activities makes it necessary that equipment funds be provided.

The request for Nuclear Safety will provide replacement equipment for the five aircraft which are the cornerstone of DOE's emergency response resources, as well as minimal critical additional and replacement equipment for the associated remote sensing laboratories providing radiation detection and data reduction equipment for use in aircraft, vans, all-terrain vehicles, and supporting facilities. These data indicate the extent and concentration of surface depositions due to effluents from DOE operations at both nuclear and non-nuclear facilities. Equipment is also needed in support of critical instrument and dosimeter development programs designed to assure DOE conformance with national regulations and standards for radiation protection of workers. These include the development of improved dosimetry systems for neutron, beta, photon (x-ray) extremity, and internal doses. Major items to be purchased include increased sensitivity spectral analyses equipment, and an "interface control module" for track etch processing and reading. (DOE is scheduled to replace all current worker neutron dosimeters in FY 1987 with a new type utilizing the track etch technique which will greatly improve our ability to assess worker exposure to neutrons.)

The equipment request for Operational Safety and the Assistant Secretary's support staff will provide expansion of the operating system for the Safety Performance Measurement system and associated disk drives for memory to accommodate data handling capability for increased loads on six primary modules of the system; continue upgrading of existing instrumentation to support onsite chemical analysis for hazardous substances, and necessary instrumentation required to initiate a new study to evaluate the efficacy of loaded HEPA filters under fire attack.

Equipment funds are requested to attain full operation of a computer-assisted information tracking system for environmental and safety data to monitor compliance and progress in completion of corrective actions.

The request for Environmental Analysis will provide capital equipment funds to be used by both headquarters and the National Laboratories. These funds are needed to complete standardization of ADP systems so that all field organizations and headquarters groups involved in acid rain analysis have the maximum communication potential and ability to share software and data. In addition, this equipment will be used by laboratory/headquarters analysts in excercising the new environmental residuals projection models. Equipment procured will include disk and tape drives, plotters, and other peripheral devices dedicated to Environmental Analysis projects and software packages necessary for system-wide standardization.

The increase over the FY 1986 budget level is required to purchase computer peripheral equipment to implement a computer assisted information tracking system; provide adequate replacement equipment to support the national resource maintained by the Department to respond to incidents involving radioactive materials; and provide equipment for the DOE radiation measurement accreditation program.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
ENVIRONMENT, SAFETY AND HEALTH

Energy Supply Research and Development
Environmental Audit and Compliance

Environmental Survey Project
DOE Sites

Total Estimated Cost (TEC) $60,000,000

Environmental Survey
DOE Sites

Total Estimated Cost (TEC): $60,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1985 B/A	FY 1986 B/A	FY 1987 B/A	FY 1988 B/A	Total Cost B/A a/
Operating expenses (DOE):						
Survey of Sites	0	0	1,500	2,000	1,500	5,000
Sampling and Analysis	0	0	6,000	28,000	21,000	55,000
Capital equipment	0	0	0	0	0	0
Total Operating Expenses	$ 0	$ 0	$ 7,500	$30,000	$22,500	$60,000
Other DOE funding:	0	0	0	0	0	0
Total DOE funding:	0	0	7,500	30,000	22,500	$60,000
Non-DOE funding:	0	0	0	0	0	0
Total funding	0	0	$7,500	$30,000	$22,500	$60,000 a/

a/ The initial Environmental Survey of the 40 sites will be completed in late FY 1988; however, there will be a continuing program of regular environmental audits in FY 1989 and future years to monitor progress of corrective actions and to ensure compliance with environmental laws and regulations.

Department of Energy
FY 1987 CONGRESSIONAL BUDGET
MAJOR ACTIVITY OVERVIEW

Liquefied Gaseous Fuels Spill Test Facility

Background

The public as a whole derives direct and indirect benefits from the production and use of liquefied gaseous fuels (LGFs). These benefits accrue from a wide range of uses including transportation and domestic fuels, fertilizers, and feedstocks for numerous industrial processes. Industries that supply these materials have developed sophisticated safety technology and procedures as a result of many years of operational experience and the controlling influence of industry-generated standards and government regulations. However, it is clear that benefits derived from using LGFs are accompanied by a finite level of risk if they are accidentally released or improperly handled. The potential hazards associated with accidental LGF releases include burns, asphyxiation, fire, explosions, and toxic effects.

In the last decade several large research and development programs addressing LGF concerns and many smaller related efforts have been conducted by industry and government organizations in the U.S., Europe, Japan and other countries. In 1977, the Department of Energy (DOE) assumed lead agency responsibility for government-sponsored research on the safety and environmental control of liquefied natural gas (LNG). As this program developed, its scope was enlarged to address safety issues of other materials with potential hazards similar to those of LNG, including liquefied petroleum gas (LPG), ammonia (NH_3), and hydrogen (H_2). This effort was known as the DOE Liquefied Gaseous Fuels (LGF) Safety Research Program, and was the culmination of the Government's effort to protect public health and safety as well as the environment from the potentially hazardous effects of these materials.

The DOE LGF Safety Research Program has been a principal contributor to the body of new knowledge of LGF release behavior and hazards. During its brief history, the Program significantly increased the available knowledge of LGF hazard phenomena by the execution of small- and medium-scale LNG spill tests, through the development of necessary models and background information, and performing release prevention and control assessments. This knowledge has practical application as a basis for regulatory decisions, industry actions, and public information relating to LGF safety issues.

Additional research and testing is required to determine the effects of LGF spills of larger quantities and higher spill rates, and to obtain data on other hazardous materials. A Congressional initiative to provide a permanent Spill Test Facility to conduct this research was approved in September 1982 and funds were included in the FY 1984 Appropriation Bill. The Nevada Test Site was designated for construction of the Liquefied Gaseous Fuels Spill Test Facility to be located at the Frenchman Flat area. The Spill Test Facility will permit for spill tests at larger volumes and will allow safety research on a broader range of hazardous materials.

Program Goals and Objectives

The overall goals of the Liquefied Gaseous Fuels Spill Test Facility Program are:

- to design, construct, and make available on a user-fee basis a facility suitable for conducting spill tests of liquefied gaseous fuels and other toxic liquids, and
- to promote the development by users of liquefied gaseous fuels and toxic liquids, of an experimentally-verified technical data base that will aid in the prevention, mitigation, cleanup, and prediction of environmental effects of spills of these materials.

When complete, the Facility will provide the test bed for the development of safety and environmental control information needed by government regulatory agencies, industry, and the general public to assure the protection of the public health and safety as well as the environment from the potentially hazardous effects of liquefied gaseous fuels and other toxic liquids. Specific objectives under these goals include:

- Development and validation of LGF release behavior in sufficient depth to provide a firm technical foundation for development of industry standards and promulgation of regulations.
- Investigation, development, and validation of methods for preventing accidental LGF spills.
- Investigation, development, and validation of methods for controlling the consequences of accidental LGF releases.

Operation of the Test Facility by the Federal Government on a cost recovery basis for users is key under these goals.

Experimental testing is required to better understand the phenomena and physical effects associated with accidental releases of LGFs and the technology needed to mitigate or prevent such releases. Results of larger volumes and rates of release under simulated conditions are the prime purpose for constructing and making available the Spill Test Facility.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
LIQUEFIED GASEOUS FUELS SPILL TEST FACILITY
FOSSIL ENERGY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986[1/] Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Liquefied gaseous fuels spill test facility					
Operating expenses	$ 399	$ 1,732	$ 1,732	$ 1,200	$ -532
Construction expenses	3,900[2/]	...	...	...	...
Subtotal	4,299	1,732	1,732	1,200	-532
Total					
Operating expenses	399	1,732	1,732	1,200	-532
Construction expenses	3,900	...	...	...	...
Liquefied gaseous fuels spill test facility	$ 4,299[3/]	$ 1,732	$ 1,732	$ 1,200	$ -532
Staffing Total FTE's: Direct ...	0	0	0	0	0
Indirect .	0	0	0	2	+2

[1/] Adjustments to the FY 1986 Appropriation are shown on the table on the following page.

[2/] Cognizant Congressional committees approved the reprogramming of funds within the Energy Supply Research and Development (ESR&D) appropriation to provide an additional $2.4 million to complete the construction of the Liquefied Gaseous Fuels Spill Test Facility. The $3.9 million includes $1.5 million of the $2.0 million appropriated in FY 1985 for operating expenses.

[3/] The FY 1985 amount reflects offsets of $101,000 for management initiative savings and $2,400,000 in prior year funds reprogrammed from other activities within the ESR&D appropriation.

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Department of Energy
FY 1987 Congressional Budget Request
Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	Gramm-Rudman-Hollings	Total
Liquefied Gaseous Fuels Spill Test Facility			
Operating Expenses	$1,800	$-68	$1,732
Total, Liquefied Gaseous Fuels Spill Test Facility	$1,800	$-68	$1,732
Operating Expenses	1,800	-68	1,732

Summary of Changes

FY 1986 Appropriation enacted	$ 1,732
Program increases and decreases:	
Liquefied Gaseous Fuels Spill Test Facility	
o Retain core scientific personnel at FY 1986 level in order to continue to provide adequate technical support to the Nevada Operations Office Manager	-532
FY 1987 budget request	$ 1,200

Liquefied gaseous fuels spill test facility:

Goals/Objectives:

The overall goals of the Liquefied Gaseous Fuels Spill Test Facility are:

- to design, construct, and make available on a user-fee basis a facility suitable for conducting spill tests of liquefied gaseous fuels and other toxic liquids, and
- to promote the development by users of liquefied gaseous fuels and toxic liquids, of an experimentally-verified technical data base that will aid in the prevention, mitigation, cleanup, and prediction of environmental effects of spills of these materials.

The facility will provide the test bed for the development of safety and environmental control information needed by governmental regulatory agencies, industry, and the general public to assure that protection of the public health and safety as well as the environment from the potentially hazardous effects of liquefied gaseous fuels and other toxic liquids. Specific objectives under these goals include:

- Development and validation of LGF release behavior in sufficient depth to provide a firm technical foundation for development of industry standards and promulgation of regulations.
- Investigation, development, and validation of methods for preventing accidental LGF spills.
- Investigation, development, and validation of methods for controlling the consequences of accidental LGF releases.

FY 1986 Accomplishments:

- Complete spill test facility construction to accommodate FY 1986 optional "test window".
- Provide for the availability of the test facility on a user-fee basis.
- Provide policy guidelines for operation and maintenance of facility.
- Consumate agreements with organizations such as DOT, GRI, Chlorine Institute and Dow Chemical for experimental testing at the facility.

Budget Request By Subactivity:	FY 1986 Approp.	FY 1987 Request	Net Change
Liquefied gaseous fuels spill test facility	$ 1,732	$ 1,200	$ -532

The Liquefied Gaseous Fuels Spill Test Facility Program has significantly increased the available knowledge of liquefied gaseous fuels (LGF) hazard phenomena through the successful execution of small and medium-scale liquefied natural gas spill tests. These tests led to the development of necessary models, established a basis of background technical information and provided the information required to conduct release prevention and control assessments. This knowledge has practical application as a basis

Environmental Survey
DOE Sites   Total Estimated Cost (TEC): $60,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification

The Environmental Audit and Compliance Program was initiated in FY 1986 as a principal element of the Secretary's plan to strengthen the Department's Environment, Safety and Health Programs. The goal of the Program is to ensure that the Department's operating facilities are in compliance with all applicable environmental requirements and to reduce areas of existing environmental risk. This is accomplished through a number of activities which include: a one-time baseline Environmental Survey of all DOE operating facilities followed by a continuing program of regular environmental audits of all operating facilities; a continuing process of evaluating compliance needs and establishing budget priorities DOE-wide; evaluations and recommendations concerning the selection of corrective measures; and continuous tracking and monitoring of compliance progress from initial identification of needed corrective measures through completion and operation of such measures.

As Secretary Herrington stated in September 1985 on announcing these new initiatives: "While the record of the department in this area has generally been a good one, I want to be certain that this department looks ahead to the many challenges of the future with a strong and aggressive program in place to meet our commitments to a clean environment, public health and safety. Some of our facilities have been in use for nearly 40 years and we have learned a great deal about conducting hazardous activities. The environmental problems we are finding now at DOE facilities are, for the most part, legacies from the past, from activities conducted in a different atmosphere and under different standards than today's. What was acceptable in 1945 is not acceptable in 1985. For these reasons, shortly after becoming Secretary of Energy I ordered a thorough review of this department's environment and safety functions. I do not intend to let today's activities create problems for tomorrow. We must apply the sophisticated knowledge and techniques that we have acquired to our daily operations. This is my personal commitment to a quality environment and to the safety of our workers and all Americans. It is my pledge that the Department of Energy will be dedicated to correcting environmental problems we have now and establishing a framework for addressing environmental problems in the future."

Project Description

The Survey Program covers all media, i.e., air, water, and soil, and all areas of environmental regulation, e.g., the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Response, Compensation, and Liability Act. The Survey Program also covers all DOE programs and major operating facilities and involves a baseline survey of approximately 40 DOE sites at which there are an estimated 600 inactive waste areas, 300 hazardous waste management areas, 1800 air emission stacks, and 400 wastewater outfall pipes.

The environmental baseline survey of a site is conducted by a multidisciplinary team of specialists headed by DOE ES&H personnel. There are 5 survey teams with 7 to 10 members on each core team. The core teams are supplemented, for sites with a large number of inactive waste disposal areas by additional 2 or 3-member components specialized in the assessment of such areas. The team leader and assistant leader for each team are Federal ES&H employees, who are supported by technical experts from the National Laboratories and contractors.

A major cost component of the baseline survey is preliminary sampling and analysis sufficient to determine the existence and seriousness of environmental problems at DOE sites. Most of the preliminary sampling and analysis activity is directed at the Department's inactive waste disposal areas.

Schedule of Planned Activities

	Start	Complete
Initial 5 sites to be surveyed and sampled	8/86	11/86
Next 20 sites to be surveyed and sampled	12/86	9/87
Final 15 sites to be surveyed and sampled	11/87	11/88

Management and Contracting

The Environmental Audit and Compliance office has an existing contract with the NUS Corporation to assist the federal staff in gathering preliminary data on each site, participating as technical team specialists on the survey teams, and analyzing the voluminous site data and the sampling data. A follow-up new contract for site survey support is anticipated in late FY 1986/early FY 1987. The site sampling and analysis for each site is expected to be accomplished by the DOE multi-program national laboratories which will be EPA-certified to ensure maximum confidence in the site sampling analyzed data.

Current Year Achievements (FY 1986)

Implement the Environmental Survey by completing all necessary planning and preparatory activities and initiating the environmental baseline survey for the first group of 5 sites. Planning and preparatory activities include: assembling a staff; procuring support services; analyzing available site information; developing an implementation plan and schedule for the survey; developing detailed site survey plans for each of the five sites to be surveyed; developing survey procedures; developing sampling procedures; developing risk assessment methodologies and criteria for establishing budget priorities; and developing a database for recording and managing the survey results.

Cost Estimates

	Total Cost
o Survey of Sites	
- Preliminary Assessments (Information Analysis 600 areas @ $5,000/area	$5,000
- Audit of Records, Contractor Personnel interviews as necessary to determine problem areas (does not include sampling/analysis): 40 DOE sites @ $50,000/DOE site)	
o Sampling and Analysis	
- (CERCLA, 200 inactive waste areas @ $200,000/area)	$40,000

- (Clean Water Act, 100 samples/ site x 40 sites @ $1000/sample);	$15,000
- (Clean Air Act, 40 sites @ $50,000 /site);	
- (RCRA, 50 land disposal areas @ $180,000/area)	
Total Estimated Cost	$60,000a/

a/ The initial Environmental Survey of the 40 sites will be completed in late FY 1988; however, there will be a continuing program of regular environmental audits in FY 1989 and future years to monitor progress of corrective actions and to ensure compliance with environmental laws and regulations.

Incorporation of Fallout Shelters

Not Applicable

Federal Compliance With Pollution Control Standards

This project will contribute to compliance by identifying environmental risks and corrective actions, and follow-up to ensure that corrective measures are completed.

Evaluation of Flood Hazards

Not Applicable

Environmental Impact

No Environmental Assessment is necessary for the Survey effort. Full NEPA documentation will be prepared before corrective actions are budgeted and started.

for regulatory decisions, industry actions and public information relating to LGF safety issues. In 1982, the House Appropriations Subcommittee on Energy and Water Development proposed funding for the construction of a Liquefied Gaseous Fuels Spill Test Facility where tests could be performed on hazardous chemicals and liquefied gaseous fuels. Following Congressional action on the Continuing Resolution (P.L. 97-377), funds were allotted for the construction of the facility on March 1, 1983.

During FY 1984 and FY 1985, a site was selected for the facility (the U.S. Department of Energy's Nevada Test Site), detailed design was completed and construction begun. Anticipated accomplishments for FY 1986 include: completion of construction, facility "shake-down", and user-sponsored testing.

The Department of Energy's (DOE) Liquefied Gaseous Fuels Spill Test Facility (LGFSTF) at the Nevada Test Site (NTS) will be capable of the rapid release of large quantities of cryogenic or pressurized flammable or toxic materials. The facility is being built in concert with and in response to the needs of many industrial and governmental organizations.

The facility is designed to satisfy the need for information for risk assessment, emergency response, regulation, plant design, plant siting, and hazard mitigation. It will be capable of spilling up to 200 m^3 (53,000 gal.) of cryogenic fluids such as Liquefied Natural Gas (LNG) or refrigerated ammonia at rates between 5 and 100 m^3/min. (1,000 - 26,000 gpm). In addition, up to 90 m^3 (24,000 gal.) of ambient temperature materials such as Liquefied Petroleum Gas (LPG) or chlorine, with pressures up to 2000 kpa (300 psi), can be released at rates between 2 and 20 m^3/min. (500 - 5,000 gpm). An extensive sensor and data acquisition system is available to acquire data on spill characteristics such as rate, volume, temperature, and pressure; downwind gas concentration and aerosol characteristics; meteorological parameters; and blast or fire effects.

The Frenchman Flat area of the NTS provides a uniquely favorable environment in which to perform large-scale atmospheric dispersion tests. Steady winds from the southwest occur with great regularity during the summer months for a variety of atmospheric stability conditions. Large-scale tests with toxic materials are possible because only limited access, federally controlled land is present for some 60 km (40 mi.) downwind.

The potential hazards associated with accidental Liquefied Gaseous Fuels releases can be divided into several areas of concern. These include:

1. Vapor generation and dispersion - The generation of vapors represent a significant threat of explosion.
2. Fire - Four types of combustion phenomena may occur in a spill; ignition, vapor cloud burn-up, pool fired, and detonation.
3. Flame propagation - Deflagration or detonation may occur after a spill, releasing large amounts of thermal energy. Deflagration is the spread of a flame front rapidly but subsonically through a fuel/air mixture. Detonation is the propagation at supersonic velocity.
4. Scale effects - Transportation of LGFs are projected to occur in large quantities. The concentration of very large quantities may lead to spills thousands of times larger than previously encountered.
5. Environmental and ecological impacts - the accidental release and dispersion of LGFs may be detrimental to the surrounding environment by threatening large-scale destruction of plant and animal life.
6. Human health impacts - LGFs contain high concentrations of toxic materials which may be hazardous to human health.

Experimental testing is required to better understand the phenomena and physical effects of the above hazards associated with accidental releases of LGFs and the technology needed to mitigate or prevent such releases. Results of larger volume and rates of release under simulated conditions are the prime purpose of constructing and making available the Spill Test Facility.

Funding in FY 1987 will provide a bridge from the current DOE program to one supported by industry and other government agencies. It will provide the fiscal flexibility needed to assure program continuity and facility responsiveness on a timely basis to user sponsored testing activities. It is anticipated that most of this funding associated with maintaining facility responsiveness and continuity will be offset with funds made available by the users for whom testing is conducted. A minimum number of key scientific personnel would be retained for the purpose of conducting tests, data collection and reduction, and test results and analysis.

Also, funding will be used to organize those activities necessary for insuring successful annual facility check-out and start-up, to establish credibility with potential customers, and to aid in the development of specific plans and products for those customers.

Once the demand for service is established, the cost of the core research team and other services will eventually be financed by user-payments. By FY 1988, sponsors of work at the facility should be paying for all of the facility related expenses. It is therefore recommended that contingency funding be budgeted in FY 1987 to insure continuity in the program and not disbanding the core group while scheduling customers in FY 1987. This funding is expected to be recaptured through the application of user fees in that year.

Facility preventive maintenance is estimated to cost approximately $200,000 per year, and will include such activities as assuring weather protection for building and tank farm control and operative devices; repair and replacement of minor failed system components; establishment and maintenance of a spare parts inventory; initial "test season" check-out and calibration of instrumentation and control systems; and "off-season" surveillance and access control.

A continued federal effort, at this time, will allow the Government to participate in and be responsible for a socially useful project devoted to the public safety across a wide spectrum of activities, i.e., transportation, utilities, petro-chemicals, gas, oil, etc.

DEPARTMENT OF ENERGY
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
VOLUME 3
BIOLOGICAL AND ENVIRONMENTAL RESEARCH

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DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Biological and Environmental Research

The budget request for FY 1987 for the Biological and Environmental Research (BER) program is $196,565,000. Within this budget, $184,565,000 is for operating expenses, $8,500,000 for capital equipment, and $3,500,000 for construction. This request will allow continuation of the current year program activities and enhanced efforts on the health effects of environmental radon.

The mission of the Department of Energy in energy research and national defense has brought with it major responsibilities and opportunities in the life sciences. The responsibilities stem from concerns that the energy technologies which contribute so substantially to the material well being of the American people, may also have adverse health and environmental impacts. The opportunities arise because many of these same technologies, and the intellectual and physical resources underlying their development, have made major contributions to the health and welfare of society, and hold promise for even greater contributions in the future. Thus opportunities and danger are both present, and a central goal of the Biological and Environmental Research program (BER) is to maximize the former while helping to minimize the latter.

A central objective of the Department's health and environmental effects research is to create a knowledge base that will permit a realistic assessment of the impact of energy strategies before they are adopted. The accumulation of such knowledge requires long term research that is comprehensive and multidisciplinary in its scope, and quantitative and mechanistic in its level of understanding. Health and environmental effects research sponsored by the Department and its predecessor agencies has ranged from pioneering molecular investigations of such fundamentally important processes as DNA damage repair mechanisms, through systemic studies such as those that provided the earliest information on bone marrow transplantation, to the investigation of global processes that govern atmospheric transport.

These studies, and many others like them, were originally motivated by an effort to understand the effects of radiation on human health, and the mechanisms by which radionuclides move through the environment and the food chain. They have, however, had consequences which far exceed the original programmatic goals. Thus, the ability to identify and quantitate repair enzymes has led to major new insights into the genetic determinants of susceptibility to certain types of cancer with the discovery of increased risk in deficient populations. Research of this type, on molecular markers for susceptibility and resistance, is spawning a major subfield of molecular biology. Similarly, the basic research on bone marrow transplantation has provided much of the information upon which modern organ transplantation rests; while the research on atmospheric physics and chemistry has turned out to be central to approaching problems such as acid rain and changes in the atmospheric concentration of "greenhouse" molecules, which are currently of major concern to society.

Research in molecular epidemiology on understanding the molecular basis of diathesis and resistance to damage by radiation and toxic chemicals, will receive increased emphasis. The identification of populations that are particularly susceptible or resistant to certain types of insults is not only of the greatest significance to medical sciences, but it will have a major positive impact on the Department's mission by permitting an approach to setting health standards that takes account of population heterogeneity at the doses to which human populations are ordinarily exposed. Similarly, the extraordinarily high quality research on atmospheric processes, which is providing the insights needed to develop optimal strategies for addressing energy related and national defense problems, will be strengthened. Other environmental programs also require strong support as evidenced by the large number of recently published reports that describe the health and environmental issues of the day. These are most comprehensively discussed in the Report on Long Term Environmental Research and Development of the Council of Environmental Quality (March 1985). For example, models of transport and chemical reaction in soil are crucial to rational decisions related to citings of toxic waste dumps and to optimal decisions on mitigation measures to correct past mistakes. The difference between optimal strategies based on knowledge gained through research, and far from optimal strategies, amounts to hundreds of billions of dollars in economic and health costs.

One of the extraordinary characteristics of the BER program is its comprehensiveness: the global nature of its scope--compelled by its mission--is unique to the nation and perhaps to the world. This breadth makes it ideally suited to carry out certain types of programs. An example of immediate societal concern is radon research. Recent information indicates that the potential exposures to radon gas and its daughter products in residential structures, and the number of people so exposed, may by substantial. A precise definition of the risk to health presented by these exposures, and the formulation of a rational strategy for the abatement of the risk, requires the entire spectrum of activities sponsored by the BER program. Thus, fully addressing the issue of radon health effects will require the development and testing of models of radon transport through the environment, carefully controlled epidemiological studies, and fundamental studies of the mechanisms by which radon produces damage. The first of these will permit the prediction of indoor radon levels and its state of aggregation from measurements exterior to a home; the latter two will provide information on the risk associated with a given level of radon.

This brief description indicates that the BER programs aimed at addressing the health and environmental impacts of energy strategies have led to fundamental scientific advances with major implications for human health and the economy that far exceed the goal of identifying potential hazards. There is, however, an additional and equally important component to the program's goal that is related to the unique capabilities of the Department of Energy.

The Department, by virtue of its role in the physical and engineering sciences, has extraordinary interdisciplinary capabilities, and unique capital intensive equipment. These capabilities have been widely recognized. In FY 1985, other Federal, state, and local agencies and private industry invested over $115,000,000 at these facilities for the conduct of health and environmental research to help address their mission needs. Many BER-funded scientists in the onsite laboratory program also hold academic appointments and serve as an important resource in the formal education of the nation's scientists, engineers, and physicians. The research projects supported at the laboratories and universities serve as vehicles for the training of hundreds of predoctoral students and post-doctoral investigators. Opportunities are provided for research collaboration by full-time visiting scientists. Finally, the unique facilities and research instrumentation annually attracts over 600 part-time users from the scientific community.

This combination of unrivaled physical and intellectual resources has led to major advances in medicine, and holds promise for equally important contributions in the future, both in medicine and biology. Historically, the focus has been on nuclear medicine: the development and application of non-invasive imaging techniques for diagnosis and treatment of disease, and the production of radionuclides and radiopharmaceuticals for the treatment of tumors, and for the study of metabolic and other kinetic processes. Through collaborative programs with university and private hospitals, applications are pursued through the clinical feasibility stage, and into the technology transfer process. The advances made in this way have helped cure or alleviate the sufferings of hundreds of thousands of people throughout the world and have spawned industries with markets valued at hundreds of millions of dollars per year. For example, Thallium 201 alone was administered to several hundred thousand patients in 1981 for the diagnosis of heart disease and its use has saved over $78,000,000 per year in medical expenses.

The future is equally promising with such new developments as magnetoencephalography which will permit the study of neurological processes with previously unattainable precision; with the promise of neutron capture therapy for treating cancer, and with the spectacular success of heavy ion therapy for curing small and otherwise untreatable brain lesions. Important new approaches are also being pursed which show great promise for the prevention and treatment of ischemic heart disease by measuring subtle changes in regional metabolism of heart muscle before and after interruption of coronary bloodflow.

Another development which emerged from the nuclear industry is the cell sorter; an instrument originally intended to separate radiation damaged cells from normal cells. Its impact has, however, far exceed the most optimistic justifications for its development. Rapid cell sorting capabilities have had a major impact on cytology, immunology and cell biology in general and have spawned a major new industry. Among its routine uses are blood cell counts, detecting genetic abnormalities and monitoring cancer treatment. More recently, improvements in the method have permitted the creation of a chromosome specific DNA library which scientists believe will advance the course of human genetics by a decade; an advance which will certainly be a major step forward in the diagnosis and treatment of genetic diseases.

Numerous other examples of major achievements in measurement concepts and devices, originally motivated by highly circumscribed needs, have been documented in a recent BER publication. Their impact on medicine, biology and the environmental sciences have been substantial; their impact on the economy alone more than pays back the cost to the taxpayers of the BER program and its predecessors.

In addition to the intellectual and scientific resources which have made these technologies possible, the national laboratories possess multiuser facilities that are having a major impact on elucidating the structure of biological molecules. Such structural determinations are required for a rational approach to a variety of molecular design problems; e.g., the modification of proteins so that they have a specified type of activity. Moreover, the unparalleled computational resources and the broad capability to exploit them fully, also provide the environment necessary for major advances in predictive capability for small molecule structure-activity relations, which is central to problems in identification of mutagens and carcinogens, and the design of drugs and vaccines. The development of rational approaches to drug design and protein engineering can lead to commercial markets with enormous health and economic impact. Together, these structural biology activities will provide the firm foundation crucial to maintaining America's competitive advantage in private sector biotechnology during the coming decades.

The BER program budget request includes funds to support 89 FTE's at the Environmental Measurements Laboratory. The staff are Federal employees doing research in the areas of ecology, instrumentation and analytical development. This is a Government-owned, Government-operated facility, with complete laboratory capabilities.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
BIOLOGICAL AND ENVIRONMENTAL RESEARCH
ENVIRONMENTAL R&D
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Environmental R&D					
Operating Expenses					
Biological and Environmental Research	$174,405	$166,237	$166,237	$180,965	$+14,728
Program Direction......	3,475	3,129	3,129	3,600	+ 471
Subtotal............	177,880	169,366	169,366	184,565	+15,199
Capital Equipment.......	7,141	7,457	7,457	8,500	+ 1,043
Subtotal............	7,141	7,457	7,457	8,500	+ 1,043
Construction............	2,725	3,127	3,127	3,500	+ 373
Subtotal............	2,725	3,127	3,127	3,500	+ 373
Total					
Operating Expenses......	177,880	169,366	169,366	184,565	+15,199
Capital Equipment.......	7,141	7,457	7,457	8,500	+ 1,043
Construction............	2,725	3,127	3,127	3,500	+ 373
Environmental R&D......	$187,746[a]/[b]/	$179,950[b]/[c]/	$179,950[b]/[c]/	$196,565	$+16,615
Staffing Total FTE's:					
Headquarters...........	53	53	53	53	---
Field..................	90	89	89	89	---
Total..................	143	142	142	142	---

Authorization: Section 103, P.L. 93-438, Section 203, P.L. 95-91.

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[a]/ FY 1985 total does not include $1,650,000 transferred to the SBIR program. FY 1985 total reflects a reduction of $530,000 for ADP general reduction.

[b]/ Totals reflect a reduction of $2,455,000 in FY 1985, $2,735,000 in FY 1986, and $3,074,000 in FY 1987 for management initiative savings.

[c]/ FY 1986 total reduced by $7,071,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
BIOLOGICAL AND ENVIRONMENTAL RESEARCH
(In thousands of dollars)

1986 Appropriation enacted	$ 187,021
1986 Gramm-Rudman reduction	- 7,071
1986 adjusted	179,950
o Continue analytical characterization in support of complex chemical studies; enhance occupational health research; maintain development of advanced radiation and chemical instrumentation	+ 1,761
o Sustain field and laboratory studies on transport and transformation of radionuclides, organics and trace elements through atmospheric, terrestrial and aquatic media	+ 3,010
o Maintain epidemiologic studies; expand automated health effects detection system; continue studies of biological markers, and long-term experimental radiation and complex chemical mixtures research.	+ 8,237
o Expand molecular biology research, especially gene library work; accelerate structural biology efforts re pulsed neutron sources; continue cell biology and chemical physics research	+ 1,917
o Sustain carbon dioxide research program of data collection, measurement and modeling; implement a few high priority research recommendations from state-of-the-art report	+ 994
o Curtail development of new nuclear medicine procedures through production and labeling of new radionuclides, instrumentation advancement, and demonstration of clinical feasibility and extend techniques to elucidate the basis for mental disease and normal brain and heart functions	- 1,191
o Increase program direction for increased personnel costs	+ 471
o Emphasize support for capital equipment and construction needs	+ 1,416
FY 1987 budget request	$ 196,565

	FY 1985	FY 1986	FY 1987 Request
Biological and environmental research................	$187,746	$179,950	$196,565
1. Late Effects on Health and Environment of Energy Development and Use			
a. Source and Dose Determination................	15,656	14,810	16,571
b. Environmental Processes and Effects.........	32,383	29,867	32,877
c. Health Effects..............................	63,424	57,710	65,947
d. General Life Sciences.......................	28,535	27,953	29,870
2. Nuclear Medicine..................................	21,335	23,311	22,120
3. Carbon Dioxide Research..........................	13,072	12,586	13,580
4. Program Direction................................	3,475	3,129	3,600
5. Facility Operations..............................	9,866	10,584	12,000
	$187,746	$179,950	$196,565

1. Late Effects on Health and Environment of Energy Development and Use

This component of the BER program carries out the Department's responsibility for conducting a comprehensive program of research and development on the human and environmental health effects of energy technologies and programs. The research is managed in four closely interrelated areas in order to fully encompass this complex program responsibility. The first subprogram, Source and Dose Determination, provides physical and chemical information on energy-related materials released to the environment, and develops advanced techniques for measuring exposure to these agents. The next subprogram, Environmental Processes and Effects, improves our capability for describing the transport and transformation of materials through the atmospheric, marine, and terrestrial environment and evaluates their effects on ecosystems. The Health Effects subprogram investigates the human health consequences of exposure by direct studies on human populations that have been exposed occupationally, accidentally or for medical purposes, and by research at the molecular, cellular, and experimental animal level. Underlying this targeted effects research effort is a fundamental research subprogram, General Life Sciences, which explores the mechanisms whereby physical and chemical agents interact with biological systems to produce damage and how such damage is either repaired by normal biological processes or expressed as observable end effects such as cell death, mutation or cancer.

a. Source and Dose Determination.................... 15,656 14,810 16,571

Evaluation of the exposure of a human or ecological population to radiation or chemicals is the **initial step in estimating consequent health effects**. The exposure may be determined indirectly by characterizing a radiation or chemical source and tracking the agents from source to receptor population, or directly by measuring the exposure with suitable instruments. The source and dose determination program develops the necessary information and techniques to address this responsibility. **Analytical Studies** are pursued to define the chemical and physical nature of energy-related agents that may be sources of human or ecological exposure. Such agents may be direct sources of exposure in the workplace, or they may be released to the general environment with consequent general population exposure. **Dosimetry Research** is designed to improve methods for the direct determination of human exposure to energy-related agents. Research in **Measurement Science** develops the advanced radiation and analytical instrumentation required to pursue effectively the broad scope of the health and environmental effects research program.

Analytical Studies

The enhanced exposure of the general population to **environmental radon** in residential and commercial buildings due to the application of advanced energy conservation technology may result in health risks to the general public that considerably exceed those from any other energy technology. An expanded effort is planned to develop predictive models which describe indoor levels of radon and radon daughters as a function of soil concentration, porosity and permeability, of building design, and of ventilation practice. This research on the sources and transport mechanisms of radon, the properties of radon decay products in the indoor atmosphere, and the factors affecting the ultimate energy deposition in the respiratory system will be applied to health effects studies and the development of appropriate mitigation and control techniques.

Chemical characterization programs are currently defining the biologically active ingredients in complex chemical mixtures related to energy production and use. A continued orderly reduction in this effort is planned in concert with the restructuring of the chemical mixtures research program which is directed at establishing principles for predicting the health effects of such mixtures in humans.

Dosimetry Research

Accurate measurement of dose not only enables a reliable determination of individual exposure, but also provides data needed to improve work practices and to reduce worker exposure. Current dosimetry research includes radiation dosimeter development with emphasis on mixed field neutron-gamma exposures, internal and external dosimetry technology, and on techniques for assessing exposure to energy-related chemicals. A new research initiative to develop and evaluate dosimetry techniques for assessing indoor exposure to thoron (radon-220) and thoron daughter products will be pursued. In addition, enhanced studies on particle growth and size distribution on attachment rates for radon and thoron daughters and on their fate in the indoor environment will be conducted.

The important Japanese **A-bomb survivor dose reassessment** will continue at a lower level, emphasizing the completion of the overall uncertainty analysis and the final reports for all phases of the program. The dosimetry system in place at the Radiation Effects Research Foundation will be generating the definitive organ dose data needed for the establishment of human dose-response relationships. The results will be applied to the interpretation of radiation monitoring data in terms of relevant radiation protection quantities and for adjustment of protection standards if necessary.

Research is also conducted to achieve improved personnel and field monitoring systems for **determination of exposure to organics** and other chemical\materials related to the nonnuclear energy technologies. Specifically, the use of monoclonal antibodies is currently being investigated as a means of determining exposure to high molecular weight organic hydrocarbons. In addition, the feasibility of measuring and monitoring changes to the DNA molecule as an indication of exposure to organic materials is being explored.

Measurement Science

Progress in chemical characterization, dosimetry research and in a broad range of environmental and biomedical investigations is critically dependent on the availability of **advanced and innovative measurement tools and techniques.** A continuing program of basic and applied research is conducted focusing on key measurement needs. In FY 1987 a phase down of research on instrumentation techniques for measurement of toxic gases and effluent pollutants will occur as existing projects are completed. New or expanded efforts are planned in semiconductor radiation detection devices, remote measurement techniques for biologically active substances, and laser spectroscopy for chemical analysis.

Basic studies on new techniques for radiation detection now emphasizes **advanced semiconductor detectors** and specialized electronic signal processing techniques to provide measurement systems with low noise, better sensitivity and high count rate capabilities. **Mercuric iodide**, in particular, has been shown to operate at ambient temperatures with energy resolution approaching that of today's best liquid nitrogen-cooled silicon detectors. Avoiding the penalties of weight, size, and complexity associated with such cooling makes these mercuric iodide systems particularly attractive for portable and remote applications. A prototype device based on BER-sponsored research at the University of Southern California has, in fact, been flown on space shuttle missions to monitor gamma ray dose to the crew.

Laser-based techniques which enable extremely sensitive and selective measurements are being employed in a variety of applications. Resonance ionization spectroscopy, particularly in combination with mass spectroscopy, continues to find important new uses. Measurement of as few as 1000 atoms of the isotope Kr-81 in groundwater has been successfully demonstrated thereby providing a means of dating samples several million years old. This information can be used to model the subsurface transport of toxic substances and to help identify potential waste disposal sites. A laser-excited solid state fluorescence technique called fluorescence line narrowing spectroscopy (FLNS) has been applied to measurement of the compounds ("adducts") formed between DNA and carcinogenic polycyclic aromatic hydrocarbons. These adducts are believed to be an early step in the development of cancer and may ultimately provide a foundation for more precise assessment of risks. The FLNS technique is so powerful that it can detect a single adduct in one hundred million DNA bases, and can distinguish between adducts formed by different carcinogens.

Research to improve the detection and measurement of hazardous chemicals has produced a technique for distinguishing very similar hydrocarbons by **negative-ion mass spectrometry.** This technique is based upon the differing electron affinities of otherwise similar compounds, i.e. their ability to capture an electron. It is now possible to distinguish biologically active compounds such as benzo(a) pyrene, a potent carcinogin, from its inactive isomer, benzo(e) pyrene, thus improving the capability for quantifying the hazardous component of complex mixtures.

	FY 1985	FY 1986	FY 1987 Request
b. Environmental Processes and Effects..............	$ 32,383	$ 29,867	$ 32,877

In FY 1987, an increase is planned for atmospheric and environmental research. Funds will be used in the marine program for development of automated instrumentation to measure water chemistry and particle abundance, thereby reducing future requirements of expensive ship time. In the terrestrial area, research on radon exhalation from soils and building material will be enhanced to develop predictive models for determining radon flux under different environmental conditions and thereby allow better prediction and mitigation of indoor radon. Also, controlled field scale experiments will be initiated to provide much needed information on the use of natural systems as detoxification and mitigation filters for energy contaminants in soil and ground water.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer. (1)	General Reduction (2)	Management Initiatives (3)	Pay Cost Restoration (4)	FTE General Reduction (5)	Gramm-Rudman-Hollings (6)	ES&H Transfer/ Reprogramming (7)	Subtotal (8)	Comparability Adjustments (9)	Total (10)
Environmental R&D										
Biological & Environmental Research										
Operating Expenses Biological and Environmental Research	$174,700	$ -1,000	$ -936		$ —	$ -6,528		$166,237		$166,237
Program Direction	3,600	-251	—		-93	-127		3,129		3,129
Subtotal	178,300	-1,251	-935		-93	-6,655		169,366		169,366
Capital Equipment	7,750					-293		7,457		7,457
Contruction	3,250					-123		3,127		3,127
Subtotal, Biological and Environmental Research......	189,300	-1,251	-935		-93	-7,071		179,950		179,950
General Reduction:										
Operating Expenses	-1,251	1,251								
Capital Equipment										
Construction										
Total, General Reductions	-1,251	1,251								
Management Initiatives:										
Operating Expenses	-935		935							
Capital Equipment										
Construction										
Total, Management Initiatives	-935		935							
Total, Biological & Environmental Research.......	187,114				-93	-7,071		179,950		179,950
Operating Expenses	176,114				-93	-6,655		169,366		169,366
Capital Equipment	7,750					-293		7,457		7,457
Construction	3,250					-123		3,127		3,127

Upon release of agents from an energy source, it becomes necessary to understand their **transport and transformation** through atmospheric, terrestrial and marine media in order to estimate the subsequent exposure to humans and the environment. This research activity dates from the early weapons testing era when information on the transport and fate of fallout radionuclides was needed. To meet this need, a comprehensive program in the physical and ecological sciences was established which today is being applied to multiple energy-related activities.

Another component of the environmental research program centers on the response of ecosystems, populations and individual species affected by energy-related disturbances and discharges. This effort aims at the anticipation of environmental impacts before they happen, and at the understanding of these impacts in order to allow the prevention or alteration of deleterious consequences.

Atmospheric Transport and Transformation

The BER program in the atmospheric sciences is concerned with the movement of energy-related pollutants through the atmosphere (transport) and their chemical and physical changes during transport until they are deposited on the earth (transformation). The FY 1987 request will sustain ongoing research programs with some additional emphasis on atmospheric organic chemistry.

A question central to the acid rain issue is the relationship between emissions in the midwest and acidic deposition in the northeast. The "**PRECP program**" (Processing of Emissions by Clouds and Precipitation) was initiated in FY 1985 to investigate the proportionality between pollutant releases, particularly SO_2 and NO_x, and the subsequent deposition of acidic species at great distances.

The PRECP program became fully operational in FY 1985. Field experiments were designed to determine the aqueous phase changes that sulfur and nitrogen compounds undergo as they are incorporated into various cloud systems. This design attempts to provide measurements of sulfur, nitrogen and other reactants in the air mass entering the cloud, in-cloud chemical changes, and analysis of the products leaving the cloud. A series of field experiments, centered in Columbus, Ohio, was carried out during April 1985. An "air cavalry" methodology was employed with various aircraft being deployed over a wide area to capitalize as much as possible on promising meteorological situations. The results of these studies and of laboratory-chemistry studies and modeling efforts will provide significant input to the major on-going National Acid Precipitation Assessment Program (NAPAP) effort to develop a comprehensive Regional Atmospheric Dispersion Model. The program in FY 1987 will emphasize analysis and interpretation of the massive data cumulated in the field experiments, and will plan field experiments in different types of storm systems.

The FY 1985 **ASCOT** (Atmospheric Studies in Complex Terrain) **experiments** in Colorado addressed valley flows and the coupling of the local flows with regional scale winds. The experiments involved a massive collection of meteorological and chemical tracer data. These data will form the basis for FY 1987 field experiments in Western Colorado. The decision has been made to extend the range of the ASCOT experiments from 10's of kilometers to 100's of kilometers and to continue to study the exchange of air masses between adjacent valley systems.

A new initiative begun in FY 1986 was the **Western Air Chemistry study**. Initially, this involved an effort to document the air chemistry of the ASCOT area and other relatively unpolluted Western regions. In FY 1987, this program will address the air chemistry of energy related emissions and their interaction with organic emissions from vegetation in the very sunny and arid atmosphere of the West. It is anticipated that this work will be closely coordinated with other chemistry research related to the reactions of organic emissions with ambient pollutants such as SO_x, NO_x and ozone.

The data from the FY 1984 **Cross Appalachian Tracer Experiment** (CAPTEX) forms the basis for a model comparison workshop scheduled in early FY 1986. The CAPTEX data base made possible the first comprehensive comparison of long range dispersion models and as such has made a major contribution to the understanding of regional scale tropospheric transport and dispersion. Plans are being developed for additional tracer experiments on the multi-thousand kilometer scale.

The applied laboratory and field programs in atmospheric science will continue to be undergirded by a continuing **fundamental research effort** to provide kinetic and thermodynamic data measurements for important atmospheric chemical reactions.

Marine Transport and Transformation

Beginning with the study of processes that distributed radioactive fallout through the oceans into the food chain, this program has pioneered the use of natural and artificial radionuclides to determine movement and mixing rates of water masses, flushing rates and major sinks of contaminants in the coastal zone and deeper oceanic areas. In the future, the ocean will have to be seriously considered for disposal of some of the waste products generated by expansion of energy technologies. Research conducted under this program on cycling and movement of materials off our coast will provide crucial information for decisions on appropriateness for ocean disposal of these wastes.

The present program is subdivided into **three regional areas.** In the **Northeast** a 10 year research program has been planned to analyze processes that move and alter materials, from the atmosphere and surface water to the continental shelf. Called SEEP (Shelf-Edge Exchange Processes), this program examines the mechanisms that remove chemicals from the water, and the processes that cause contaminants to bind to the sediments or to be released back to the water column. The first phase of SEEP has been completed and has caused considerable excitement among oceanographic scientists because the movement of particles offshore to the continental shelf appears to be along trajectories not originally expected. The second phase (SEEP II) will be initiated in 1987.

In the **Southeast**, our marine research has discovered how Gulf Stream eddies and upwelling drive water masses and nutrients on the mid and outer shelf. These studies on Gulf Stream intrusions have been synthesized into a recent comprehensive publication on outer-shelf dynamics. Present research is being concentrated on the near-shore zone where a front of freshwater from coastal rivers exists. The SPREX (Spring Experiment) of 1986 and FLEX (Fall Experiment) in 1987 will help determine why cross shelf transport is so spasmodic in this region, and what controls the periodicity and volume of the discharge to the deeper off-shelf ocean waters. Early evidence indicates that most near-shore currents move along shore but that periodically, the trapped coastal water appears to escape seaward particularly in the spring and in the fall seasons. This research contributes to a better understanding of the removal of chemicals, wastes and other materials from the near shore region and their transport across the continental shelf.

In the deep ocean basins off **California**, a new program will investigate the vertical and horizontal movement of materials. This study will address the interaction of waste runoff materials with particles in the water and their decomposition and remineralization.

Terrestrial Transport

Research in this area has focused historically on the transport and accumulation of radionuclides and other energy materials through environmental pathways leading to humans and the migration of these materials in soil and water especially around DOE facilities. This research has demonstrated which plants and animals concentrate radionuclides and other chemicals, and which chemical, physical, and biological properties can minimize their uptake in ecosystems.

A **challenge for the next decade** will be to better understand the biogeochemical mechanisms that affect the toxicity of chemical contaminants, and the movement of these materials in subsurface environments. Specifically, information is required on the hydrological transport of organic compounds, trace metals, and radionuclides; geochemical attenuation by soils and geological strata; and uptake of contaminants by biological systems in order to understand the boundaries within which terrestrial disposal of waste is possible and environmentally acceptable. Not only costly, engineered solutions but also natural systems can provide an important link to effective disposal and detoxification. This program concentrates on natural systems as mitigation factors. Advanced technologies including supercomputers, fiber optics, and remote sensing are an integral part of this research. Beginning back in FY 1983, increased priority was given to energy-related organic contaminants, their decomposition products and movement of these constituents in the ground water. This emphasis will continue to expand through 1987.

National Laboratory-University consortia have been formulated to focus scientific resources on this important research area. In the period FY 1987 - FY 1990, controlled field scale experiments will continue to provide an essential intermediate step for larger controlled experiments at natural sites beyond FY 1990.

Ecosystem Functioning and Response

Energy production and development can affect water use and produce varying degrees of landscape disturbance. Prediction of the extent and persistence of such human-related impacts is critically important, as is the development of mitigation strategies for reducing serious impacts. Prediction and mitigation can be successful only if basic processes affecting ecosystem functioning are well understood.

Past research conducted under this program has elucidated the sulfur cycle in forested ecosystems which is now providing crucial information on acid rain. Information on carbon cycling developed with support of this program is now a central part of the evaluation of CO_2 buildup.

In FY 1986, this program focuses on the understanding of changes in ecosystems functions in relation to water stress. For example, at the DOE National Environmental Research Park at Savannah River, the existence of different radioisotopes in surface and ground waters and sediments, and comprehensive background information on hydrology and ecological systems provide a unique opportunity to conduct **research on wetland processes** at several levels of ecosystem organization.

This emphasis on water stress is also being applied to arid and semiarid ecosystems at the Nevada Test Site and the National Environmental Research Parks at Idaho Falls, Hanford, and Los Alamos, and in the extreme cold regions of the Arctic tundra. Models integrating across complex organizational levels from individual cells to ecosystems are being actively developed along with manipulative studies at these diverse sites. Thus, in addition to research at the watershed and landscape unit level, this program explores the **physiological responses of organisms to water stresses** which affect the composition and health of the communities. This hierarchical approach to ecosystem modeling has put this program in the forefront of ecological theory especially as concerns the application of quantification methodologies for the spatial patterning of landscapes.

Such research is also important for providing the basic foundation for **utilization of biotechnology techniques in the environment**. The better the knowledge of how systems work, the better is our ability to predict optimal usage of biotechnology within the environment.

	FY 1985	FY 1986	FY 1987 Request
Health Effects................................	$ 63,424	$ 57,710	$ 65,947

The Health Effects research program provides a continuing source of information required to ensure that the operations and policies of the Department can be supported in terms of protecting the health of workers and the general public. Research in this program is designed to meet that responsibility by the development of a broad, scientifically sound data base for evaluating the potentially adverse health effects that could result from exposures to radiation and chemical agents most relevant to Department of Energy programs and operations. There are two principal subprograms. One program utilizes human epidemiological data obtained from selected human populations known to have been exposed acutely to moderately high, or to chronically low levels of external radiation, internally deposited radioactive materials, or complex chemical materials of the type that could be encountered, for example, in connection with the production or use of synthetic fuels. The other subprogram is designed to provide detailed health effects data, including data on mechanisms by which health effects are induced and expressed, which cannot be obtained from human studies. This subprogram makes use of experimental animals chosen on the basis that they are useful models for human beings. In addition, animal organ and tissue cultures, as well as animal and human cell cultures, are extensively used (1) to develop an understanding of basic mechanistic principles involved in the production of radiation and chemical effects which are applicable to most species and (2) to strengthen our capability to extrapolate experimentally-derived data to man. Both subprograms include molecular-level studies. Like other parts of the overall BER program, the Health Effects research program depends on basic biological research to provide new methods and concepts which quickly find application in both subprogram areas.

Human Health Effects

The **epidemiologic research** program comprises studies which attempt to provide needed scientific data and, at the same time, provide information of important practical significance. These studies include investigations of human populations with occupational or environmental exposure to energy-related pollutants. Among the major populations which have been under study for several years are DOE/DOE contractor workers, Japanese atomic-bomb survivors, nuclear shipyard workers, and New Mexico uranium miners. These population studies will be supplemented by studies of lung cancer cases in Pennsylvania and New York and of communities located near DOE facilities. The former studies are attempting to determine if there is a potentially causal relationship between lung cancer and residential exposure to radon gas and its progeny. The latter study utilizes previously-collected data such as the 1960, 1970 and 1980 censuses and mortality data compiled by the National Center for Health Statistics, to investigate clustering of diseases related to proximity to DOE laboratories and other operations.

During FY 1987, the results of the nuclear shipyard study will be available. These results have been anxiously awaited for some time, and are expected to greatly refine our confidence in low-level radiation risk estimates which have been developed through extrapolation from populations exposed at high doses and dose rates. Also during FY 1987, it is expected that expansion of the Health Surveillance System now operating at two DOE sites will begin to provide unique data on morbidity effects from occupational exposures at DOE facilities. Similarly, the intensive effort to characterize the industrial hygiene aspects of these facilities in order to identify chemical hazards which may be responsible for some apparently deleterious health effects that have been discovered in previous epidemiologic investigations will continue.

Biological markers research looks for those subtle changes from the normal in biological function or morphology that are associated with exposure to a pollutant of concern. Once identified, these biological markers may then be applied in epidemiology, clinical research and occupational medicine or, conversely, these fields may provide the association which ultimately identifies the marker. Ongoing efforts include a project that is correlating consistent chromosome aberrations with radiation and/or chemical exposures. This project has been expanded to identify the oncogenes involved in these aberrations, possibly leukemia genes. Another biological markers project is obtaining, by direct inspection, information on the chromosome constitution of normal human spermatozoa as well as those from men who may have been exposed to potentially harmful pollutants. This research will provide for the first time a method to analyze large numbers of human germ cells. In another study, specific locus mutations are measured directly in human sperm. It will be the first method of this kind. These interrelated efforts at the forefront of human molecular biology will continue at a slightly increased level. A new project to study cultured human cells for cytotoxic and genetic damage after exposure to indoor complex mixtures will begin in 1987.

DOE policy has long encouraged conservation techniques in both residences and workplaces. Nationwide, new building technology has gone far in implementing these policies -- at the same time, public power utilities have actively encouraged weatherization of existing structures. Assuring human health and safety in these tightened structures, a result of DOE conservation policy, is an objective of **indoor air quality research.** Efforts studying the health effects of advanced conservation techniques will continue, and further work on indoor complex chemical mixtures as well as biological aerosols in energy saving, heating and cooling systems will begin. While radon has been the most serious concern and focus of much of the human health research, these other areas remain largely unexplored by any Federal agency. Wherever possible, such research will be done in a cooperative fashion with other agencies such as the Consumer Products Safety Commission, Environmental Protection Agency, and Health and Human Services to assure maximum use of existing facilities and available funds.

An expanded radon research program will initiate several new innovative human exposure methods such as radon bioassay development. Pb-210 (Lead) in mine and mill workers has shown promise as an indicator of the integrated radon daughter exposure. A two-part study to measure Pb-210 concentrations in former mine and mill workers, while they are still alive, and preserved animal bones and bones obtained at autopsy from uranium workers will further investigate the utility of this integrator of radon daughter exposure. In addition, recent highly sensitive laser analysis techniques have been developed for obtaining data on human exposure to uranium. Radon and daughters in blood or urine are two possible indicators of current (perhaps integrated) exposure to radon and radon daughters. These biological dosimeters offer the potential of measurement of population as well as worker exposures and will be developed in conjunction with the animal experiments.

Experimental Health Effects Research - Biological Systems

The principal source of health-risk information upon which existing standards and guidelines for limiting human exposure to biologically active environmental agents are based on the analysis of increased incidences of cancer and other late-occurring diseases in human populations exposed to those or similar chemical or physical agents. It has become increasingly obvious that human data alone are inadequate to provide such information for some of the radiations and energy-related complex chemical mixtures of specific concern to the Department of Energy. Similarly, inadequate data are available for predicting human health effects resulting from exposures to combinations of toxic organic compounds and radiation, a situation that must be considered in many occupational and public exposure situations.

To meet these needs, the experimental health effects research program aims at providing health risk evaluation data from carefully controlled **laboratory-based studies** using a multispecies comparative approach encompassing multiple levels of biological complexity (animals, organs/tissues, cells, and molecules). This approach seeks predictive correlations between cellular/molecular events and whole animal responses. The program has two major thrusts; (1) to supply the kinds of quantitative experimental data that can be used as a primary source of information to assess human risk, and (2) to provide, on a continuing and progressive basis, a scientifically sound data base to remove or minimize the uncertainties that exist in developing useful human risk assessments. Two distinct but interrelated subprograms exist for meeting these goals within the restricted mission of the Department. To meet the first objective, detailed **toxicological dose-response studies** are conducted with long- and short-lived laboratory animals to provide reliable quantitative estimates of increased incidences of delayed somatic effects that result from low-level exposure to ionizing radiations or complex chemical mixtures related to energy production and use. Similar studies are also conducted to provide detailed experimental evaluation of the genetic risk for heritable mutations that could result from exposure to the same physical and chemical agents. Most of these studies attempt to duplicate the chronic, low-dose exposure conditions that might be expected to exist for occupational groups, as well as the general population, as a result of the activities of the Department. At the same time, however, **basic research studies** are carried out to evaluate the importance of exposure and biological variables, including dose-rate and age at time of exposure, in modifying risks of delayed somatic and genetic effects. This second objective is met by a subprogram which seeks to provide an understanding of the basic physical, chemical, and biological mechanisms involved in production of delayed somatic and genetic effects in mammalian cells, tissues, organ, and organisms. These latter studies are not only inherently important in establishing general biological principles in toxicology but also in establishing a sound basis for extrapolating experimentally-derived data to estimation of human health risks.

Late Effects Dose-Response Studies

The largest segment of this program involves the use of long-lived animals to provide **lifetime risk data** for induction of cancer and life-shortening by internally deposited alpha-emitting radionuclides of importance in production of fissionable material and by actinide radioisotopes as well as gamma- and beta-emitting fission products that are of concern in nuclear waste management activities of the Department. Some of these studies were initiated 7-12 years ago and the data obtained constitute a primary source of health risk information for use on a continuing basis. These programs will be adequately supported to their completion. The animal populations involved in the radionuclide studies are presently nearing the post exposure age when they will become at high risk for developing cancer. Materials taken from tumors and normal tissues of these animals provide an invaluable resource to study the relationships between molecular markers, such as **oncogenes and chromosome alterations** in radiation induced cancer. Such studies were initiated at Pacific Northwest Laboratory in FY 1985 and if successful, will be expanded in FY 1986 and FY 1987. On a multilaboratory basis, studies define the microdosimetry of deposited radionuclides and the specific target cells for cancer induction.

Increased effort will be made to better define human health risks associated with nonoccupational exposures to radioactive radon daughter products. Animal inhalation studies will focus on quantitative radon exposure - response relationships for tumor induction by radon daughters in the rodent respiratory tract. This work will be coordinated with efforts to identify unequivocally cells at risk of tumor development and to measure the absorbed radiation dose (i.e., deposition of energy) in critical cellular targets. Basic cell research will be used in conjunction with flow cytometry in work on the separation and characterization of target cells. Molecular correlates of cellular responses to radon daughters will also be evaluated, including expression of cell oncogenes. Additional animal studies will be conducted to clarify the role and importance of cigarette smoke as a factor in modifying risks from inhaled radon daughters. This research will define tumor initiating and promoting activities of radon daughters and cigarette smoke and determine if the sequence of exposure to these toxic materials may significantly affect the final biological response. Information gained from the total multilevel research effort, as planned, should improve the interpretation of human health studies and better define radon-daughter dose levels that are of concern in regard to the general population.

The major emphasis in the **external radiation studies** is devoted to better quantifications of the maximum RBE (relative biological effectiveness) of **neutrons** at low doses and low dose-rates. It is obvious now that detailed animal dose-response studies are not logistically or economically feasible for the dose range below 10 rad. New types of statistical models are being used to make the best use of existing data approaching that dose range. Such analysis now suggest that there is a linear dose-response relationship for both neutrons and gamma rays, which argues for a constant RBE in that crucial dose-range. A number of short-term *in vitro* cell studies have been initiated to test the hypothesis of constant RBE at doses in the range of 1 rad of neutrons. There is some indication to date that x- and gamma radiation actually are "incomplete carcinogens" in that secondary factors, not directly related to the radiation itself, may determine whether or not tumors develop. These studies, when coupled with the *in vivo*/*in vitro* cell and tissue studies described below, may resolve many of the existing questions that have been raised in the health protection community about the need to reduce the maximum permissible dose of neutrons for workers in the DOE program. These critically important studies will be accelerated in FY 1987.

Dose-response studies in short-lived animals (rodents) will continue in order to define **classes of chemicals** in energy-related complex chemical mixtures that produce late somatic effects other than cancer (e.g., congenital abnormalities, neurotoxicity, immunotoxicity). Additional dose-response studies in rodent species will be needed to validate carcinogenic and mutagenic properties previously observed in cell bioassay studies. Also, in need of validation in the mammalian organism are synergistic and antagonistic interactions that are known to occur between components of complex mixtures when examined in simple model systems. The principal goal of research in this area is to develop sufficient understanding of factors controlling the properties of complex mixtures so that toxicologic properties may be estimated from readily measured chemical and biological parameters. Hence, basic and mechanistic research is emphasized, as discussed below. In research on both radiation and chemical mutagenesis, improved methods for detecting, monitoring, and quantifying **heritable mutations** in human and animal populations is urgently needed and will be expanded. Current research in the General Life Sciences area is developing molecular techniques for characterizing molecular alterations in both genes and gene products (e.g. protein molecules). As these methods become available for routine use, they will be applied in genetic studies of exposed animals.

Mechanisms of Production of Late Effects

As was mentioned earlier, there are limited human data available for making sound estimates of human health risks associated with low-level exposure to the kinds of radiations or complex chemical mixtures of concern to the Department. This subprogram aims to reduce the uncertainties in using that limited information as well as the larger data base derived from laboratory-based experiments to obtain such estimates. The research provides a fundamental understanding of the physical and chemical reactions that can produce biological damage and the molecular and cellular changes that lead to the observed genetic and somatic effects in important target organs and tissues of mammalian species. When such studies are conducted on a comparative basis, they provide a sound basis for extrapolation of experimentally derived data to human beings.

Ongoing **research in radiological physics** will be supported on a continuing basis to supply the data needed for a quantitative understanding of the early physical events (energy deposition and transfer) which lead to important biological damage. Recent emphasis has shifted from studies of gas phase reactions to the more biologically relevant reactions in condensed systems. Also, special emphasis will continue to be given to understanding the reactions with high-LET radiations including neutrons.

In the same vein, **biological studies** will continue to provide detailed understanding of the kinds of changes in key macromolecules (notably DNA) that can result in genetic changes including those that are likely to be involved in cancer production. Special emphasis will continue to be placed on research which compares those molecular changes that result from exposure to ionizing radiations and to toxic chemicals since evidence is now accumulating which suggests that it will be possible to differentiate between the kinds of mutations and molecular damage that are produced by chemicals, ionizing radiation, and ultraviolet radiations. Such information could be extremely important for developing molecular markers that can be used to estimate mammalian exposure to chemical mixtures or radiations.

Special emphasis will be given to studies that relate **cellular/ molecular changes** in the intact animal to given exposures of ionizing radiations or complex chemical mixtures. Several "multilevel" model systems have been developed which allow direct intercomparison of cells of a given tissue in the intact animal with cells cultured *in vitro*. For example, cells in the tracheal epithelium, mammary gland, and thyroid gland of rodent species can be exposed to ionizing radiations or chemical agents either inside or outside of the animal and their subsequent growth and differentiation followed either *in vivo* (i.e., in animal body) or outside of the animal (*in vitro*). Similarly, cells exposed previously to chemical mixtures or radiations in culture can then be implanted into one of the animal models and followed both *in vivo* and *in vitro* to provide detailed information on the molecular changes induced by the exposing agent. This approach is being exploited in studies of both radiation and energy-related chemicals. Since this type of work meets both of the objectives of this subprogram, funds will be redirected from other parts of the research in order to accelerate these studies, particularly in the case of research on the neutron RBE problem.

Research will also be accelerated to develop a stronger base of knowledge on mechanisms of neutron interactions with biological systems. Although the biological effects of neutron are known to differ significantly from those of x- and gamma radiation, the mechanistic basis of this difference is not known. It is planned to increase effort in research on neutron interactions at the level of the gene. This work will include research on mechanisms of DNA damage and repair. Related studies will explore the possible role of chromosome damage and oncogene activation in neutron carcinogenesis.

In a related area of research, basic **studies in cultured cells and intact animals** are carried out to elucidate the mechanisms by which components of complex chemical mixtures interact in biological systems to alter toxicologic properties. Nonadditivity of toxicities (synergism, antagonism) appears to be characteristic of highly aromatic organic chemical mixtures from fossil fuels. Such nonadditive effects may be a general property of many types of complex chemical mixtures. Although well demonstrated (e.g., in fossil fuels and cigarette smoke condensate), the cellular/molecular bases for these nonadditive effects are not understood. Increased emphasis will be given to the development of model cellular/molecular systems to elucidate the principles that govern the biological interactions. Attempts will also be made to predict interactions between chemical agents and radiations simultaneously administered to target cells/tissues. Research on specific cellular and molecular markers that correlate with delayed toxicity is also emphasized because of the potential importance of such markers as predictors of toxicologic properties.

Experimental methods have been developed to characterize mutations at the chromosomal and molecular level in a large number of mutant strains of mice developed at the Oak Ridge National Laboratory (ORNL). Emphasis in early FY 1986 will be placed on screening this mammalian mutant collection for those disease phenotypes (from the mutations) that resemble known human disease.

These mutants, carried in stock at ORNL, constitute a unique research resource for studies in mammalian heritable mutagenesis. Besides being an important component of heritable mutagenesis studies of interest to this Department, the various mutant strains of mice are made available on request to other investigators, in and outside DOE, who are interested in pursuing such work.

This subprogram is fortified by the strong General Life Sciences program described below.

	FY 1985	FY 1986	FY 1987 Request
d. General Life Sciences...........................	$ 28,535	$ 27,953	$ 29,870

Research in General Life Sciences contributes to the base of fundamental biological knowledge that is required for the effective study and interpretation of energy-related health effects. It also identifies early indicators of biological damage, develops new techniques and experimental systems for research use, and provides knowledge that eventually becomes used in the estimation of human health risk. Research in this category also supports the development of new instruments to analyze biological systems and the use of special facilities at the National Laboratories, such as neutron sources for the determination of biological structure, and state-of-the-art capabilities in scanning transmission electron microscopy, that are heavily used by the academic community for research and training.

Research on normal cell processes and functions and their regulation will be strongly supported and will emphasize studies to understand how cells divide and differentiate and what factors influence or regulate them. A related problem is to understand which cellular factors influence the stability of the differentiated state and which ones may be involved in the transformation of normal cells to a malignant state. This research is related to ongoing studies of proteins on the surfaces of cells that act as part of a membrane transport system or are part of cell receptor sites which transmit hormone-borne signals from the outside to the inside of cells. Rapid advances are being made in our understanding of the manner in which a variety of hormones or chemical regulators interact with receptor sites (regulatory sites) on cell surfaces in ways that serve to control cell growth and function. Results from recent research indicate that the presence of abnormal chemical regulators in the cell environment may trigger aberrant growth leading to tumor formation. This important concept, including the possibility that abnormal chemical regulators with tumorigenic properties may be products of activated proto-oncogenes, will be vigorously investigated. Specialized cells of the immune system such as macrophages and lymphocytes are also being studied to help us understand how the immune system acts to protect the mammalian organism from the consequences of cellular damage brought about by energy-related pollutants.

Research in genetics will focus on the structure and function of the gene, its normal and mutated configurations at the molecular and chromosomal levels, and how genes with modified structures are expressed and regulated. Of particular importance are studies aimed at identifying and cloning human genes involved in repairing specific types of radiation damage. Emphasis is shifting in other research at both the animal and cellular levels toward explaining the physicochemical and molecular basis of mutations induced by various kinds of radiations and chemical agents. Of continuing interest is research on the different spectra of mutations and DNA base-sequence changes that are produced in certain animal and human cells by chemicals and radiations. Induced mutations and structural changes appear to differ from those arising spontaneously. Preliminary evidence suggests that different mutagens may differ in the spectra of structural alterations they produce in DNA molecules. Another critical area of genetics research addresses the mechanisms underlying differentiation, neoplasia, and aging. Included is research designed to elucidate the manner in which cellular "oncogenes" may be activated or amplified by carcinogenic agents. Molecular characterization of normal and mutant genes in both somatic and germinal cells of rodents, longer-lived animal species, and humans using recombinant DNA techniques and other bioengineering approaches will be emphasized.

Research in chemical physics is investigating the fundamental processes that govern the distribution of energy within biological molecules. These studies are being made in large organic and biological molecules so that the data can be applied directly toward understanding the biological effects produced by exposure to ionizing radiation or to energy-related chemical mixtures.

Important progress is being made in **biophysical research and instrumentation** directed toward the development and application of advanced systems for measuring and determining the structure of complex components of living cells. Instruments of interest include electron microscopes, flow cytometers, and advanced optical devices. For structural biology studies at the National Synchrotron Light Source (NSLS), a beam line for the vacuum ultraviolet ring has been equipped with instrumentation to study the structure of nucleic acids and proteins. A very fast, position-sensitive x-ray detector has been developed for rapid, dynamic studies of molecular structures using the x-ray ring. With these developments, studies of the structure of biological molecules have begun at both the UV and x-ray rings of the NSLS.

Recent structural studies have identified a new form of RNA, named Z-RNA, that exists in the form of a left-handed double helix in which the two component strands of the helix wind around one another in a counter-clockwise fashion. Future research will seek to determine the biological significance, if any, of Z-RNA. Another important study has produced a detailed characterization of structural alterations induced in the DNA molecule by ultraviolet radiation (UV) and by interaction with the chemical compound, psoralen, to form a crosslink between adjacent DNA strands. Both types of agents were found to produce a kink in the normally linear DNA double helix accompanied by partial unwinding of the helical structure at sites of damage. The availability of well characterized samples of damaged DNA is expected to facilitate new research on molecular mechanisms of mutagenesis.

Improvements in the resolution, machine stability, and sorting speed of flow cytometers have made it possible to sort chromosomes with better than 95 percent purity for **gene mapping** and studies of chromosome damage, and to provide DNA samples for the construction of chromosome specific recombinant DNA libraries.

Research on a prototype electronic camera system for detection of radioisotope-labeled biological molecules separated on 2-dimensional gels or chromatograms was completed. Compared to conventional autoradiography with films, the time required for analysis of 2-dimensional gel separations was reduced by a factor of 10-100 along with improved linearity and dynamic range. An improved version of the camera, now under development, should allow direct quantitative counting of most radioisotopes with a spatial resolution of 0.5 mm and will be used in genetics research.

	FY 1985	FY 1986	FY 1987 Request
2. Nuclear Medicine Applications..................	$ 21,335	$ 23,311	$ 22,120

The use of radiation and radionuclides in the study, diagnosis and treatment of human disease is the foundation of the field of Nuclear Medicine. Historically, DOE and its predecessor organizations have played a vital role in the development of this field. This development has been possible largely because of access to the unique facilities and skills in the laboratories supported by the Department of Energy. These facilities include nuclear reactors, particle accelerators and nuclear instrumentation. Moreover, the skills of nuclear physicists and nuclear chemists have been essential factors in transferring nuclear technologies to medical applications.

The objective of the FY 1987 research program is to continue the development of new nuclear medicine procedures through the production of new radionuclides, the radiolabeling of new biologically active agents, and advancements in instrumentation. Efforts to develop other medical applications using reactors, accelerators and other related nuclear technologies will be maintained.

Within the Federal government this mission and DOE's facilities for conducting research in this area are unique. Liaison is maintained with Federal agencies (principally NIH and FDA), the radiopharmaceutical industry, and the medical community regarding the requirements and effective use of these techniques in medical research and practice.

Research emphasis on **radionuclide production** in this time period will be on the development of generator systems for short-lived radionuclides. Such generator systems consist of a parent nuclide, having a half-life ranging from hours to days, which decays to a daughter having a half-life ranging from seconds to minutes. The daughter can be periodically removed from the generator for clinical use. At present, most short-lived radionuclides are produced by a cyclotron which severely limits their availability. These generator systems will permit nuclear medicine procedures to be performed in medical facilities which do not have a cyclotron on the premises. A potential new initiative in FY 1987 is the development of a cerium 134/lanthanum 134 generator which appears to be attractive for bone marrow studies. Preliminary studies with lanthanum-140 as a tracer showed a high bone marrow uptake for lanthanum compounds. The advantages of short-lived radionuclides are lower radiation dose to the patient and the ability to conduct real time function studies.

In addition, significantly advanced isotope production capability is required. Most present accelerators were not designed for the production of medical isotopes. What is needed are dedicated cyclotrons that utilize advanced technologies such as superconducting magnets or adaptations of linear accelerators for exclusive isotope production. Improved targetry incorporating high efficiency radiochemical procedures which are remotely controlled would greatly contribute to advancing this research area. Finally, computer controlled, fully automated radiopharmaceutical preparation and delivery systems are required for broad application in a clinical situation.

Recent developments in the BER nuclear medicine program have produced new radiopharmaceuticals labeled with short-lived radionuclides. In syntheses involving the most important positron emitting radionuclides (Oxygen-15, 2 minutes; Nitrogen-13, 10 minutes, Carbon-11, 20 minutes and Fluorine-18, 110 minutes), one cannot use standard techniques. Rather, innovative rapid organo- and biosynthetic techniques must be developed using the technologies of molecular biology, biochemistry, organic chemistry, hot atom chemistry and radiochemistry.

The new short-lived radionuclide labeled radiopharmaceuticals are proving to be useful in **studies of the metabolic functions** of the brain and heart. However, the major advances that have been made to date in quantitating physiology and pathophysiology in the human brain and heart cannot be consolidated or advanced without proceeding to the next generation of biomedical studies utilizing Positron Emission Tomography. There is an urgent need for whole-body PET's to conduct research toward improving our understanding of cardiovascular physiology in man and of metabolism and mechanical function. In addition, successful development of advanced tomographic systems will have immediate medical implications in evaluation of stroke patients and diagnosis of degenerative brain disorders such as Alzheimer's, Huntington's and Parkinson's disease.

In FY 1987, research and development will be maintained and devoted to identifying and optimizing techniques for attaching radionuclides to monoclonal antibodies. Monoclonal antibodies have the potential for early detection of cancer, for following the response of patients to treatment, and for general cancer therapy. A substantial research and development effort will be required to perfect and evaluate techniques for using labeled monoclonal antibodies. It is anticipated that by FY 1987 work on monoclonal antibodies for cancer therapy labeled with yttrium-90, fermium-255, and einsteinium-253 will have progressed to the point that one or more of these agents will have been identified as having sufficient potential for clinical trials. In addition, the monoclonal antibody work will be extended to labeling with radionuclides suitable for positron tomographic diagnostic imaging.

Instrumentation research conducted by interdisciplinary teams at the DOE laboratories provides a conduit for transferring advanced electronic and detector technologies developed at the DOE facilities to the medical community. A major emphasis at present is on the development of a next-generation positron emission tomograph (PET). Presently available commercial PET systems have a resolution in the range of 8-12 mm, with two experimental systems reaching a resolution in the 5-6 mm range. These PET systems are capable of providing an image of changes of metabolic activity, but lack sufficient resolution to give quantitative measure of the specific activity in small subregions of an organ. Progress in this field has been rapid and it is anticipated that development of a prototype PET system with spatial resolution in the 2-3 mm range is likely in FY 1987.

The use of **magnetic resonance imaging (MRI) spectroscopy** to detect carbon-13 and nitrogen-15 labeled metabolites within intact tissues and cells holds exceptional promise in providing new insight into the mechanisms responsible for metabolic regulation. Because of the great importance of heart disease, current research efforts are focused on the identification of the metabolic effects in the perfused heart model of several proposed therapeutic strategies for treatment of ischemic heart disease. Efforts will be concentrated on obtaining quantitative measurements of metabolic concentrations in the heart. Most of the current applications of NMR to studies of metabolism have avoided the issue of determining the concentrations of metabolites under observation by emphasizing relative changes in the signal intensities of the metabolites detected. It is clear that much more information could be obtained from the spectra by quantitation.

A cooperative project between Brookhaven National Laboratory and Stanford University utilizing synchrotron radiation to reduce the hazards of angiography will be continued.

	FY 1985	FY 1986	FY 1987 Request
3. Carbon Dioxide Research........................	$ 13,072	$ 12,586	$ 13,580

The FY 1987 budget request for the Carbon Dioxide Research program is $13,580,000. This budget provides for: a few of the highest priority recommendations from the State-of-the-Art publications to be implemented; a very basic program of data collection and continuation of measurements and development of models; possibly one new crop (rice) will be added to the study of vegetation response to elevated atmospheric CO_2 levels; minimal monitoring of research activities of other trace gases (e.g., methane) may be possible; monitoring, but no direct participation in the International Geosphere Biosphere Program (IGBP); and, finally, a minimal core ocean program needed to couple the atmosphere, oceans and the biosphere.

The goal of the Carbon Dioxide Research program is to develop a sound, quantitative atmospheric carbon dioxide knowledge base to aid in energy policy decision making. This goal involves the following objectives: improve knowledge of the carbon cycle; improve estimates of future atmospheric carbon dioxide; improve understanding of the effects of atmospheric carbon dioxide on climate; improve understanding of the direct carbon dioxide effects on productivity of natural and agricultural systems; develop and verify methods for the first detection of climate change due to increasing atmospheric carbon dioxide; identify, define and quantify indirect effects; define possible options for mitigating long-term consequences of a higher CO_2 atmosphere.

Carbon dioxide is a small but important component of the earth's atmosphere. The global CO_2 content of the atmosphere has increased from about 315 parts per million (ppm) to 345 over the past 26 years and is presently increasing by about 1.5 ppm annually. The majority of the CO_2 increase is a direct result of man's fossil energy use.

Increasing amounts of CO_2 and other trace gases in the atmosphere could enhance the "greenhouse effect", which would result in warming of the lower atmosphere. This, in turn, could cause changes in patterns of precipitation, evaporation and wind circulation. In the last decade, physically-based, mathematical simulation models of the global atmosphere have tended to give added credence to these projections. More CO_2 will modify plant growth with the potential for increased crop productivity and changed composition of natural vegetation.

The effects of continuing CO_2 increases in the atmosphere are uncertain. The magnitude and rate of man's future use of fossil fuel further complicate the already uncertain picture. However, the scientific consensus is that global climate change involving temperature and precipitation will occur. The timing, magnitude, regionality and any subsequent benefits and/or costs are uncertain, and the extent of the uncertainty is not yet defined.

4. Program Direction	FY 1985	FY 1986	FY 1987 Request
Operating Expenses....................................	$ 3,475	$ 3,329	$ 3,600
Total FTE's..	53	53	53

The FY 1987 request for Biological and Environmental Research Program Direction is $3,600,000. These funds are required to provide for the personnel and other costs associated with continuation of 53 full-time equivalents.

This staff directs, manages, and supports a comprehensive multidisciplinary research effort designed to understand the long-term health and environmental effects associated with the development and use of fossil, nuclear and renewable energy technology options as well as the Department's nuclear weapons operations. In carrying out these responsibilities, the staff provides guidance and support for approximately 760 active research projects (reviewing and evaluating many more throughout the proposal selection process), develops long-range program plans based on their assessment of the scientific needs of the program and agency priorities, and conducts major reviews of BER sponsored programs at laboratories and universities. This requires a close liaison with other DOE programs, other Federal agencies and the scientific, academic and industrial communities. This staff also provides the administrative and program support services required to carry out the program.

The BER program has been reoriented toward a greater commitment to basic research requiring a wide range of scientific and technical expertise in all of the subprograms. This program direction request will provide the staffing resources to maintain the various professional scientific disciplines necessary to evaluate efforts carried out in the multiprogram laboratories, specialized biomedical and environmental facilities and over 125 universities, hospitals and other research institutions. The wide range of required expertise includes disciplines such as biochemistry, biophysics, molecular and cellular biology, genetics, toxicology, radiation biology, epidemiology, nuclear medicine, physiology, analytical chemistry, atmospheric sciences, ecology, oceanography and many others. There are also demands on staff for increased outreach efforts for Departmental commitments to Small Business Innovative Research and Historically Black Colleges, and for support of the Health and Environmental Research Advisory Committee (HERAC).

	FY 1985	FY 1986	FY 1987 Request
5. Facility Operations..............................	$ 9,866	$ 10,584	$ 12,000

Facility operations provide for the necessary capital equipment and general plant project needs to support the HER program and the Pacific Northwest Laboratory landlord responsibilities. The national laboratories and other onsite specialized laboratories supported by the HER program represent an impressive national resource of skilled investigators, advanced major scientific instrumentation and exceptional, often unique, research facilities. The ability to address the diversity of health and environmental research issues requires a continued commitment to maintaining their advanced instrumentation and facilities. Capital equipment ($8,500,000) and general plant projects ($3,500,000) are essential elements to facility operations.

Recent years of constrained budgets have resulted in a serious backlog of state-of-the-art equipment needs. Also, existing equipment at the laboratories is suffering from deterioration and obsolescence and is in urgent need of replacement. The capital equipment request for this program is essential for pursuing the health and environmental issues associated with energy technology considerations and to continue high quality research and advances in the development of nuclear medicine technology. Examples of capital equipment needed at laboratories and universities to support research include: scanning electron microscope, liquid chromatograph, liquid scintillation counter, spectrometer, amino acid analyzer, environmental chamber, infrared analyzer, animal caging, etc. Many of these items are interchangeable among various research efforts, and therefore, can serve numerous experiments over a period of time, making them very cost effective.

The capital equipment request also supports general purpose equipment needs at the Pacific Northwest Laboratory (PNL). General purpose equipment requirements at PNL fall into two broad capital support categories: (1) providing PNL support services and tools of a nonprogrammatic nature such as Safeguards, Safety, Security, etc; (2) PNL provides various support services such as Environmental Surveillance, Personnel Dosimetry, Photography, etc. for the entire Hanford complex.

Construction funds of $3,500,000 are requested in support of the program's general plant project needs and the Pacific Northwest Laboratory landlord responsibility. General plant projects are necessary to accommodate continuing requirements to maintain satisfactory and economical operating conditions, to meet regulatory requirements and to provide for new program developments. Process development and changes in technical program requirements frequently result in the need for alterations or new construction items not previously anticipated. In addition to satisfying programmatic requirements, general plant projects provide the alterations and additions to existing facilities needed to: 1) satisfy radiation protection, health and safety, environmental protection, and energy conservation requirements; 2) improve operating efficiency; and 3) provide optimum utilization of existing facilities.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Magnetic Fusion Energy

The goal of the National Energy Policy Plan is to foster an adequate supply of energy at reasonable costs. The Magnetic Fusion Energy program is an element of this program. The goal of this program is to establish the scientific and technological base required for fusion energy. The program is making good technical progress toward this goal. The long term need and desirability for fusion energy continues to be strong. However, the program plan and the program budgets have been adjusted to reflect improvements in our near term energy supply as well as the need for austerity in federal spending. In this situation, international collaboration is being used as a key resource to support achievement of the program goal in a timely fashion.

The development of magnetic fusion could lead to economic energy sources that possess a secure fuel reserve, as well as acceptable environmental and safety features. The fuel, deuterium and tritium from lithium, is readily available and its supply is essentially unlimited. Potential end use applications are electricity generation, the production of synthetic fuels, nuclear fuels, and high grade heat for industrial applications.

Nearer term benefits of fusion development include an increase in the understanding of plasma physics and related scientific fields. Fusion also attracts and trains outstanding scientists and engineers. Fusion-related science combines plasma physics, atomic physics, nuclear physics, surface and solid state physics, and advanced computational techniques. Fusion-related technology involves superconducting systems, large magnetic systems, high power radio frequency heating systems, tritium systems, high heat flux energy recovery systems, advanced materials development, nuclear technology, real time computer control, sophisticated instrumentation, unique vacuum systems, and particle beam heating systems. The technology developed in support of fusion research has many applications in science and industry.

Over the last decade, a significant investment in equipment and facilities has been made and a core group of skilled scientists and engineers has been trained. With this investment in place, excellent and sustained progress is being made. We have reached a point now where there is general agreement that the remaining technical problems can be solved. With a sustained effort the program goal can be achieved by the time the need for new energy sources becomes acute.

The FY 1987 budget request has been developed to take advantage of the technical position that has already been established in fusion research. It will allow a continuation of cost effective progress toward the development of fusion power as a future energy option and positions the program to support the President's Geneva initiative on international cooperation in this area.

The request of $333 million represents the level of resources required to sustain an effective program. To maintain progress at this level of funding, the program has been narrowed to pursue only toroidal confinement systems. In addition, we have identified the highest priority tasks, improved the cost effectiveness of facility operations, and increased the use of international collaboration. The program has been focused to address four key technical issues; namely, the development of magnetic confinement systems, understanding of scientific principles of a burning plasma, the development of materials for fusion applications, and the development of fusion nuclear technology.

Resolution of the first issue requires the scientific understanding of magnetic confinement systems in order to develop a desirable fusion reactor system. This budget supports the minimum set of experiments to obtain this understanding. There are two principal approaches to confining a plasma magnetically: the toroidal and linear concepts. In the past, the U.S. has pursued both approaches. Beginning in 1987, such breadth is no longer feasible. The U.S. program will focus on development of only the toroidal confinement concept. The tokamak is the most advanced in terms of performance within the toroidal category. However, by studying related toroidal configurations, a better understanding of toroidal confinement will be achieved than if only the tokamak were studied. This strategy will most readily lead to improvement in tokamaks and the development of superior magnetic geometries for practical application in the future. Consequently, this budget request covers work on the tokamak, reversed field pinch, stellarator, and compact toroid variations of toroidal magnetic confinement.

The second technical issue requires the development of a facility to investigate the properties of burning plasmas. A fusion plasma burns when the heat released within the plasma by the fusion reaction is sufficient to maintain the plasma temperature in the face of heat loss from the system. The requirements for ignition should become clear from experiments planned for the Tokamak Fusion Test Reactor at Princeton, during the latter part of the 1980's. Following this achievement, at least one ignited and burning plasma must be produced and studied to complete the scientific data base. This budget supports the necessary preparatory design studies for such a facility.

The third technical issue--materials for fusion systems--affects the ultimate economic and environmental acceptability of a fusion system. Development of the desired materials must be undertaken now because of the long lead time for the required research. This budget supports a level of activity in this area necessary to establish effective international collaboration.

The fourth issue--nuclear technology for fusion systems--includes developing a fusion "blanket" that must convert the energy released by a fusion reaction into useful energy, as well as creating part of the fuel for the reactor. This budget request provides for the most essential preparatory research which will be needed to develop an acceptable blanket in future years.

The FY 1987 budget request of $333 million will maintain some effort in each of the four key technical issues. At this level the FY 1986 initiatives needed to implement the revised program plan continue while other program elements are delayed or deferred. In the Applied Plasma Physics subprogram, a core base of research is maintained. The two major device fabrication projects that were initiated in FY 1986, the reversed field pinch experiment and a compact toroid experiment will be continued. In the Confinement Systems subprogram, TFTR will attempt to reach break-even conditions in deuterium plasmas and preparations will continue for limited D-T operation in 1989. As part of the US/Japan cooperation program, Doublet III will explore beta limits with shaped plasmas. Collaboration abroad, especially on European tokamaks, will continue. Collaboration on these tokamaks allows the U.S. to gain valuable information while avoiding duplication. Studies to support expanded collaboration with the Soviets will begin. In the tandem mirror area, the TMX-U and TARA experimental programs will be completed. The MFTF-B will be mothballed. In the Development and Technology subprogram, design studies on an experiment to study the physics of ignition will be continued. Facility design and development of ion cyclotron radio frequency heating components will be emphasized. The six coil test in the

International Fusion Superconducting Magnet Test Facility at Oak Ridge National Laboratory will be completed. The ongoing materials program will be maintained at an adequate level to support international collaboration in this area, and small scale laboratory tests of critical blanket issues will be carried out.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
MAGNETIC FUSION ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT - OPERATING EXPENSES
ENERGY SUPPLY RESEARCH AND DEVELOPMENT - PLANT AND CAPITAL EQUIPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Magnetic Fusion Energy					
Applied plasma physics					
Operating Expenses.......	$ 78,937	$ 69,692	$ 69,692	$ 70,700	$+ 1,008
Capital Equipment........	3,170	5,619	5,619	4,500	- 1,119
Subtotal................	82,107	75,311	75,311	75,200	- 111
Confinement systems					
Operating Expenses.......	206,395	188,650	188,650	177,500	-11,150
Capital Equipment........	15,400	14,529	14,529	7,100	- 7,429
Subtotal................	221,795	203,179	203,179	184,600	-18,579
Development and technology					
Operating Expenses.......	67,900	57,059	57,059	50,510	- 6,549
Capital Equipment........	5,100	4,330	4,330	1,890	- 2,440
Subtotal................	73,000	61,389	61,389	52,400	- 8,989
Planning and projects					
Operating Expenses.......	12,201	5,528	5,528	4,780	- 748
Capital Equipment........	3,800	3,801	3,801	3,820	+ 19
Construction.............	32,500	12,653	12,653	8,200	- 4,453
Subtotal................	48,501	21,982	21,982	16,800	- 5,182
Program Direction					
Operating Expenses.......	4,150	3,608	3,608	4,000	+ 392
Subtotal................	4,150	3,608	3,608	4,000	+ 392
Total					
Operating Expenses.......	369,583	324,537	324,537	307,490	-17,047
Capital Equipment........	27,470	28,279	28,279	17,310	-10,969
Construction.............	32,500	12,653	12,653	8,200	- 4,453
Magnetic Fusion Energy.....	$429,553 a/ b/	$365,469 b/ c/	$365,469	$333,000 b/	$-32,469
Staffing Total FTE's.......	66	62	62	62	--

Authorization: Section 209, P. L. 95-91

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a/ FY 1985 total does not include $3,671,000 transferred to the SBIR program. The FY 1985 total reflects a reduction of $2,940,000 for ADP general reduction.

b/ Total reflects a reduction of $7,194,000 in FY 1985, $10,000,000 in FY 1986, and $10,811,000 in FY 1987 for management initiative savings.

c/ FY 1986 reflects the following comparability changes: $673,000 from Development and Technology to Planning and Projects for inventories, $15,395,000 from Planning and Projects to Confinement Systems for MFTF-B, and $3,989,000 from Applied Plasma Physics to Planning and Projects for Small Business Innovative Research. This aligns the FY 1986 funds consistent with the budget allocation in FY 1987. Total reduced by $14,358,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm-Rudman-Hollings).

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
ENVIRONMENTAL R & D
BIOLOGICAL AND ENVIRONMENTAL RESEARCH

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: General plant projects

2. Project No.: 87-R-120

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 2nd Qtr. FY 1987

4. Date construction ends: 2nd Qtr. FY 1989

5. Previous cost estimate: None
Date:

6. Current cost estimate: $3,500
Date: 12/85

7. Financial Schedule:

Fiscal Year	Obligations	Costs FY 1985	FY 1986	FY 1987	After FY 1987
Prior Year Projects	XXXXXXXX	$ 4,034	$ 1,848	$ 726	$ 205
FY 1985 Projects	$ 2,725	256	365	1,099	1,005
FY 1986 Projects	3,127	0	364	1,300	1,463
FY 1987 Projects	3,500	0	0	875	2,625

8. Brief Physical Description of Project

This estimate is for minor new construction and other capital alterations to land, buildings, and utilities systems. The estimate also includes the cost of installed equipment which is an integral part of the general plant subprojects.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects

2. Project No.: 87-R-120

8. Brief Physical Description of Project (continued)

Although it is difficult to detail this type project in advance, all of the subprojects identified below are under consideration. In general, the estimated costs for each of the subprojects are preliminary in nature, with a project limitation of $1,200,000, and primarily indicative of the size of the project. The continuing review of our requirements will result in some of the projects being changed in scope; it will also result in other projects being added to the list with the necessary postponements of some now listed, all depending on conditions or situations not apparent at this time. Since needs and priorities may change, other projects may be substituted for the examples listed below, and some of these may be located on non-Government owned property. These general plant projects will provide facilities for conducting critical research programs, contribute to greater efficiency, eliminate health and safety hazards, and will reduce maintenance and operational costs.

The estimate is based on requirements by office as follows:

Summary by Office	
Albuquerque Operations Office............	$ 1,500
Oak Ridge Operations Office...............	500
Richland Operations Office................	1,000
San Francisco Operations Office...........	500
Total..................................	$ 3,500

9. Purpose, Justification of Need for, and Scope of Project

The following is a tentative tabulation of the major projects to be performed at the various laboratories under the operations office listed.

Albuquerque Operations Office

Inhalation Toxicology Research Institute.. Controlled material storage facility, primate housing facility modifications, chilled water system, and other emergency repairs.	$ 1,000
Los Alamos National Laboratory.. Health research laboratory addition and other emergency repairs.	500

1. Title and location of project: General plant projects

2. Project No.: 87-R-120

9. Purpose, Justification of Need for, and Scope of Project (continued)

Oak Ridge Operations Office Oak Ridge Associated Universities Low humidity chromatography room, replacement of roof at Scarboro facility, and other emergency repairs.	500
Richland Operations Office Pacific Northwest Laboratory Miscellaneous capital work orders, e.g., laboratory additions, improvements, and modifications.	1,000
San Francisco Operations Office Lawrence Livermore National Laboratory Upgrade air handling and toxic exposure animal facility, refurbish water circulation system for marine biology, and other emergency repairs.	500

10. Details of Cost Estimate

Based on preliminary conceptual design.

11. Method of Performance

Design will be by negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	General Reduction	Management Initiatives	Pay Cost Restoration	FTE General Reduction	Gramm-Rudman-Hollings	CSRA Transfer/ Reprogramming	Subtotal	Comparability Adjustments	Total
Magnetic Fusion Energy										
Applied Plasma Physics										
Operating Expenses	$ [illegible]	$ [illegible]	$ [illegible]			$ [illegible]		$ [illegible]	$ [illegible]	$ [illegible]
Capital Equipment	[illegible]	—	[illegible]			[illegible]		[illegible]	—	[illegible]
Subtotal	[illegible]	[illegible]	[illegible]			[illegible]		[illegible]	[illegible]	[illegible]
Confinement Systems										
Operating Expenses	[illegible]	[illegible]	[illegible]			[illegible]		[illegible]	[illegible]	[illegible]
Capital Equipment	[illegible]	—	—			[illegible]		[illegible]	—	[illegible]
Subtotal	[illegible]	[illegible]	[illegible]			[illegible]		[illegible]	[illegible]	[illegible]
Development and Technology										
Operating Expenses	[illegible]	[illegible]	—			[illegible]		[illegible]	[illegible]	[illegible]
Capital Equipment	[illegible]	—	[illegible]			[illegible]		[illegible]	—	[illegible]
Subtotal	[illegible]	[illegible]	[illegible]			[illegible]		[illegible]	[illegible]	[illegible]
Planning and Projects										
Operating Expenses	[illegible]					[illegible]		[illegible]	[illegible]	[illegible]
Capital Equipment	[illegible]					[illegible]		[illegible]	—	[illegible]
Construction	[illegible]					[illegible]		[illegible]	—	[illegible]
Subtotal	[illegible]					[illegible]		[illegible]	[illegible]	[illegible]
Program Direction										
Operating Expenses	[illegible]	[illegible]			-67	[illegible]		[illegible]		[illegible]
Subtotal, Magnetic Fusion Energy......................	[illegible]	[illegible]	[illegible]		-67	[illegible]		[illegible]	—	[illegible]
General Reduction:										
Operating Expenses	[illegible]	[illegible]								
Capital Equipment	—	—								
Construction										
Total, General Reductions	[illegible]	[illegible]								
Management Initiatives:										
Operating Expenses	[illegible]		[illegible]							
Capital Equipment	[illegible]		[illegible]							
Construction	—		—							
Total, Management Initiatives	[illegible]		[illegible]							
Pay Restoration										

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
MAGNETIC FUSION ENERGY
(In thousands of dollars)

1986 Appropriation enacted	$379,827
1986 Gramm-Rudman reduction	-14,358
1987 adjusted	365,469
Program increases and decreases:	
Applied Plasma Physics	
o This decrease reflects cutbacks in selected lower priority areas primarily in theory and small-scale experimental research support	- 111
Confinement Systems	
o This decrease is primarily associated with focusing the program on the toroidal confinement configuration and completing efforts on the mirror program	-18,579
Development and Technology	
o This decrease is primarily associated with an effort to focus on the most critical technology issues	- 8,989
Planning and Projects	
o A significant portion of this reduction is associated with the completion of MFTF-B construction	- 5,182
Program Direction	
o Provide support for 62 FTE's	+ 392
1987 budget request	$333,000

	FY 1985	FY 1986	FY 1987 Request
I. Applied Plasma Physics........................	$82,107	$75,311	$75,200
A. Operating Expenses........................	78,937	69,692	70,700

The Applied Plasma Physics subprogram develops fusion knowledge through theoretical studies and small experiments that complement the larger Confinement Systems experiments and help to assure that fusion development advances steadily and cost effectively. Working closely with the Confinement Systems subprogram, Applied Plasma Physics plays a key role in the technical issue of developing magnetic confinement systems. Applied Plasma Physics also helps to establish the basis for understanding burning plasmas through its theoretical and diagnostics development activities. It contributes to the task of developing fusion materials led by the Development and Technology subprogram through its theoretical and experimental research on plasma-wall interaction. The Applied Plasma Physics subprogram is people and idea intensive. As a result, international activities in this area concentrate on workshops for discussion of ideas and longer term exchange of individual scientists for collaborative theoretical or experimental research. Through international steering committees and individual meetings, subprogram representatives seek to coordinate research activities with those of other countries to integrate areas of common interest.

Specifically, this subprogram is responsible for fusion theory, for experimental plasma research on small devices, for fusion-related atomic physics, and for development of new diagnostic techniques required to determine plasma behavior. The subprogram is also responsible for developing and testing alternate fusion confinement concepts that are not yet advanced to the point of Confinement Systems tests. Through its support of university research, this subprogram trains a large percentage of the scientists employed in all areas of the fusion program. It also manages the Magnetic Fusion Energy Computer Network that provides all of the large scale computing used by the fusion program for experimental data analysis, theoretical modeling, experimental design, and system studies.

In FY 1987, Applied Plasma Physics will continue several important tasks begun in FY 1986. Fabrication of upgraded reversed field pinch and compact toroid experiments will be continued to allow study of plasmas closer to fusion conditions in these attractive subclasses of the toroidal confinement concept. Tests of several promising theoretical ideas for tokamak improvements will be continued in small-scale experiments. More realistic models of fusion plasma behavior will be developed and tested, aided by the installation of the Cray 2 computer, the first of this new generation, at the National Magnetic Fusion Computer Center.

	FY 1985	FY 1986	FY 1987 Request
(1) Advanced Fusion Concepts.............	22,465	19,558	21,900

The Advanced Fusion Concepts category supports operation of modest scale experimental devices that investigate improvements in fusion confinement. Crucial physics tests of innovative plasma-magnetic field configurations are conducted to advance and broaden the range of understanding of plasma behavior. This level of testing extends from exploratory examination of novel approaches to intensive study of more mature innovative concepts. Research is conducted in national laboratories, industries and several universities. This activity contributes to the resolution of one of the key program technical issues, the development of magnetic systems, through the exploration of non-tokamak toroidal configurations with potentially attractive features. The majority of this effort is devoted to two toroidal confinement approaches, the reversed field pinch (RFP) and the compact toroid. Fundamentally new plasma behavior that could improve the attractiveness of fusion as an energy source has been discovered in this research. These discoveries have made possible significant progress in these approaches and may be applicable to the tokamak as well. The discoveries resulted not only from experiments in the U.S., but also from related work in Italy, Japan, and the Soviet Union that has been closely coupled to our own efforts.

Therefore, the requested budget will be used to support an important shift in emphasis that was initiated in fiscal year 1986. Two operating programs, the Reversed Field Pinch (RFP) and one version of the compact toroid called the field-reversed configuration (FRC), have met the previously established objectives for their development, and experiments are now being fabricated for the next crucial tests of confinement issues. The increment in funding is to continue this fabrication.

	FY 1985	FY 1986	FY 1987 Request
Research Operations...............	$21,501	$14,413	$12,455

The shift in emphasis in the Advanced Fusion Concepts category is indicated in the budget requests for the past two years. The decrement in Research Operations in fiscal year 1986 was needed to shift funds into the Major Device Fabrication (MDF) subcategory. Research operations in the RFP and compact toroid areas were reduced as a result. During this fiscal year, a further funding shift is needed to meet the increased requirements in the MDF subcategory. A spheromak at the University of Maryland will begin experimental operation under this funding. This device has a 25 kilogauss magnetic field strength, the highest of any spheromak. This should allow testing of plasma heating and energy confinement during FY 1987. The University of Wisconsin RFP device began operations in 1986 and will continue to investigate crucial issues of physics and stability in a unique low cost experiment. While it does not extend plasma conditions beyond present levels achievable in other RFP devices, it will be used to study improvements in the RFP geometry, and it complements the MDF experiment in this concept. Several university experimental efforts are continuing to investigate crucial issues with unique, low cost facilities.

Major Device Fabrication...........	0	4,495	9,025

Two projects were initiated in the fiscal year 1986 budget. The first project is an RFP device whose performance objectives included a plasma current capability of 4 million amperes. This device is predicted to increase the confinement parameter by three orders of magnitude beyond existing devices and reach ion temperatures of 4 keV. It is to be completed in 1990, replacing the ZT-40 RFP device at LANL. The second project, an FRC device, whose objectives include the investigation of crucial physics issues of transport and stabilization in a small, high beta plasma. It will be completed in 1989, replacing the TRX-2 device at Spectra Technology.

These two projects will enable the fusion program to investigate the confinement physics of compact, high beta toroidal configurations.

	FY 1985	FY 1986	FY 1987 Request
Supporting Studies................	$ 964	$ 650	$ 420

Exploratory experimental tests at modest levels of funding are carried out on two confinement approaches, the heliac and the dense Z-pinch. These supporting studies are characterized by either high beta or high power density concepts that may have the potential for very attractive reactor embodiments.

(2) Fusion Theory.......................	22,644	19,046	17,500

The fusion plasma theory category is responsible for the formulation and development of theories and models that explain the behavior of plasmas in fusion devices. A budget of $17,500,000 is requested to support these activities in FY 1987. In FY 1987, continued emphasis will be placed on theoretical studies to develop improvements in design and performance of toroidal concepts. Both analytical and computer models will be developed and applied. In addition, support will be provided for the modeling and interpretation of transport, confinement and auxiliary heating in the Advanced Toroidal Facility, a medium-sized stellarator experiment at ORNL, described in the Confinement Systems section. Further development of multi-dimensional simulation codes will also be supported. Models of burning plasmas will be refined in support of ignition and the burning plasma issue.

Slightly increased funding for toroidal theory will be used to strengthen the efforts in developing transport models and to study the effects of electric fields on confinement. Theoretical support of major toroidal experiments will be provided by task groups consisting of laboratory and university theorists. Further consolidation in the activities of national laboratory groups and large universities will be undertaken.

Mirror theory support will be decreased. Some theorists formerly associated with mirror theory will be redirected to work on toroidal or generic theories to support the overall program.

Funding for alternate concept theory will be decreased to reflect the decrease in research operations. Existing theories will be applied to understand the next generation of higher current, higher temperature alternate concept devices, as well as to develop and exploit uniform theoretical models which are applicable to both alternate concepts and principal concepts, such as tokamaks and stellarators.

Generic theory support will also be decreased. The requested funds will be used to support development of methods to treat non-linear problems and plasma turbulence. The Institute for Fusion Studies will be maintained at previous levels while support for atomic theory will increase slightly. The funds will cover developments in the theory of atomic processes (i.e., collisions and ionization) in plasmas, with emphasis on high temperature conditions.

		FY 1985	FY 1986	FY 1987 Request
(3)	Experimental Plasma Research.........	$16,024	$14,866	$13,215

The experimental plasma research category contributes to the understanding of fusion plasma properties through basic research and develops innovative ideas for modifications to the tokamak concept through small scale research. The activities supported are diverse, ranging from research in atomic and plasma physics to testing of specific plasma configurations and diagnostic techniques. The experimental research activities are coordinated with the major plasma confinement tests carried out in the Confinement Systems subprogram. Research is supported primarily at universities, with a few activities carried out at national laboratories and industrial sites.

Of the requested $13,215,000 in operating funds, $8,875,000 will support plasma physics research. About $3,700,000 of these funds will be directed to new tests of ideas being advanced for tokamak improvement. These experiments will test modified plasma configurations and new techniques for driving the current required in the tokamak plasma. These innovation experiments were initiated in FY 1986 with emphasis on ideas that can be viably tested on a small scale and that extrapolate to definite performance improvements. The remaining plasma research funds ($5,515,000) support basic research (for example, on particle and heat loss mechanisms) on innovative ideas which can be pursued in existing facilities (for example, electron cyclotron heating for prevention of plasma disruptions on the Texas Experimental Tokamak).

About $3,140,000 of these funds support development of new or improved diagnostic techniques. Improved diagnostics are needed for spatial and temporal resolution of plasma temperature, density, and internal magnetic and electric fields. Such improved diagnostics are developed primarily through atomic beam and laser systems. New diagnostics are needed to measure properties of the nuclear reactions and resulting heating in burning plasmas. These burning plasma diagnostics may detect nuclear products outside the plasma (neutrons and gamma rays) and must also measure properties of the fast alpha particles within the plasma. In all cases these funds support only conceptual development and first tests of diagnostic systems. The diagnostic system tests may utilize small laboratory plasmas, the TEXT user facility, or, if required, major plasma devices within the Confinement Systems program.

About $1,200,000 of these funds are for understanding basic atomic physics processes that control plasma behavior and that can be exploited for plasma diagnostic purposes. This research uses plasma devices such as the TEXT tokamak, and other facilities such as low energy ion beams, accelerators, and laser driven light sources. In FY 1987 this effort will be directed at improved understanding of collisions between electrons and impurity ions. Detailed experiments on electron-ion collisions have just recently become possible and require revisions of previously used calculations.

	FY 1985	FY 1986	FY 1987 Request
(4) National MFE Computer Network........	$17,804	$16,222	$18,085

The National Magnetic Fusion Energy Computer Network provides large- and medium-scale scientific computing facilities for the entire magnetic fusion energy program. The center and the network have continued to play a crucial role in the development of the fusion program in the United States. The network provides access for the entire fusion community, both theoretical and experimental, to first-class computing, data analysis and modeling facilities. The network and the center have served as a model for many National Science Foundation projects to provide supercomputer access for university researchers.

The National Magnetic Fusion Energy Computer Network consists of the Magnetic Fusion Energy Computer Center (MFECC) located at Lawrence Livermore National Laboratory in Livermore, California, and a number of smaller scientific computers at other locations connected by a communications network which includes satellite links and leased land lines. This network provides the flexibility to match the communications power at a site to the load at that site, thus avoiding bottlenecks and unnecessary costs. To service the computing needs of the magnetic fusion program the MFECC includes a Cray 1, a Cray 1S, and a Cray 2. The Cray 2 computer is over four times as powerful as the Cray 1S and has significantly ameliorated the capacity problems at the MFECC. In addition, the Cray 2 has an extremely large memory which makes feasible more realistic three-dimensional computations than possible on earlier machines. Indeed, within the first three months after installation of the Cray 2, problems had been solved which were not possible on earlier computers.

This budget requests an increase of $1,863,000 over the FY 1986 budget. These funds will be used to restore the User Service Centers to a level at which they can effectively support their local users, to cover cost of living increases at the NMFECC and to initiate a lease to ownership of additional disk storage which is required to support the mature usage of the Cray 2 computer.

	FY 1985	FY 1986	FY 1987 Request
B. Capital Equipment........................	3,170	5,619	4,500

An equipment budget of $3,000,000 is requested in support of the RFP MDF project. The funds will be used in partial payment for acquisition of the power supply system including a motor-generator flywheel, power converters and space preparation.

The research operations subcategory of the Advanced Fusion Concepts budget includes $700,000 for general laboratory and data acquisition equipment for experiments at the national laboratories.

$100,000 of capital equipment funds are to be used in the new tokamak improvement tests. $485,000 is to be used for general research equipment, primarily in diagnostic development ($250,000) and at TEXT ($100,000).

The sum of $215,000 is requested to procure replacement parts and some of the equipment required to maintain the network and the User Service Centers.

	FY 1985	FY 1986	FY 1987 Request
II. Confinement Systems.........................	$221,795	$203,179	$184,600
A. Operating Expenses.........................	206,395	188,650	177,500

The Confinement Systems subprogram supports the Magnetic Fusion program's goal by working on two of the four key technical issues--the development of magnetic confinement systems, and the exploration of the scientific principles governing the behavior of burning plasma. The Confinement Systems subprogram contributes to the resolution of the former issue by conducting experiments to develop a scientific understanding of high temperature, collisionless plasmas. It contributes to the latter issue by operating the state-of-the-art research devices needed to identify the conditions required for ignition and to prepare for a burning plasma experiment.

The tokamak, the stellarator, and the tandem mirror magnetic confinement concepts have progressed to the stage of medium to high temperature tests of plasma physics principles. Of these, the tokamak and stellarator are closely related toroidal systems. The tandem mirror is a linear system. Although the confinement physics of these two classes of confinement systems is different, many of the basic plasma phenomena have common elements. In addition, many theoretical and experimental techniques and much technology are applicable to both. Both toroidal and linear magnetic confinement systems are making good technical progress. However, to accommodate present fiscal constraints, further research on tandem mirrors is being deferred in order to maintain a strong, focused toroidal program.

The Confinement Systems subprogram will resolve the first key technical issue by investigating the physics of toroidal systems in order to gain the predictive scientific understanding that will make the choice of an attractive confinement configuration possible. Since the tokamak concept has advanced to the point where it can serve as the vehicle for the exploration of the scientific principles governing the behavior of a burning plasma. The study of high temperature tokamak plasmas provides the scientific basis for resolution of the second key technical issues as well.

(1) Toroidal Confinement Systems.........	151,410	141,502	151,800

The Toroidal Confinement Systems' subelement has the responsibility for research on toroidal configurations operating with fusion relevant plasma conditions. The budget request of $151,800,000 is $10,298,000 above the FY 1986 level and includes an increased effort on TFTR and the Advanced Toroidal program. The research program for toroidal configurations is planned to resolve a discrete set of basic scientific issues. These issues are investigated through experiments on several devices. Each device is designed to address one or more of these basic scientific issues.

Historically, the tokamak was the first magnetic configuration device to demonstrate good confinement of hot, dense plasmas in a moderate sized device. The demonstration was significant enough to indicate that the tokamak had the potential to become a practical fusion reactor. The progress in the last 11 years has supported this initial indication. Because of this high level of performance in confining hot, dense plasmas, the tokamak has become the first choice of the international fusion community for studying the scientific issues associated with high temperature plasmas. It is also the leading candidate for a reactor confinement concept. In FY 1986, tokamaks in the U.S., Japan, and the European communities will all be operating with plasma confinement very near to reactor requirements. Furthermore, in FY 1986 the auxiliary heating of TFTR will be advanced to the point where equivalent energy breakeven experiments in a deuterium plasma will begin. This breakeven condition occurs when the calculated fusion power output from a D-T plasma equals the heating power input. This is expected to be achieved in 1987 on the TFTR experiment.

The underlying physics in all toroidal configurations is similar enough that advances made on one configuration can contribute to the improvement of another. The stellarator, in particular, has made outstanding progress in Japan and West Germany partly because they have been able to use the physics results from the tokamak. The Reversed Field Pinch (RFP), discussed in the Applied Plasma Physics subprogram, has evolved rapidly because of the infusion of tokamak-developed diagnostics, technology and theory. The spheromak (a close relative of the tokamak which is also discussed in the Applied Plasma Physics subprogram), was discovered by scientists associated with the tokamak program and is now under active experimental study. Each of these research efforts contributes to the understanding required for the development of a practical fusion reactor.

The potential of the tokamak concept continues to be enhanced by proposed modifications which would provide substantial performance gains. Tokamak improvements are being investigated on the Princeton Beta Experiment (PBX) and by proposed advanced configurations under study at the Oak Ridge National Laboratory (ORNL), GA Technologies (GA), and the Massachusetts Institute of Technology (MIT).

The search for improving the toroidal configuration by the addition of helical fields, as in the stellarator, is supported by the Advanced Toroidal Facility (ATF) at Oak Ridge National Laboratory and by a program of international collaboration. The U.S., Japan, West Germany, and Spain collaborate very closely on medium sized stellarator experiments, thereby, making it possible to explore a significant portion of the large range of physics parameters that the stellarator can produce.

Scientific issues associated with a burning plasma are being addressed by the coordinated programs of confinement experiments in several countries. The key U.S. experiment is TFTR, which is providing the initial size and plasma parameter scaling information that is needed for the design of a burning plasma experiment. Subsequent information on auxiliary heating techniques and impurity control that will be valuable in the design of a burning plasma experiment is being obtained from the Joint European Torus (JET) and the Japanese JT-60 tokamak through a program of international collaboration on large tokamaks. In FY 1987, under a U.S./Japan agreement, the D-III-D experiment will begin substantive experiments in a D-shaped tokamak plasma to investigate stable operation with better magnetic field utilization (beta). This is a key issue in the size and cost of a burning plasma experiment. Also of interest for burning plasma experiments is the physics of ash removal and impurity control which is being studied through international collaborations on the TEXTOR (West Germany), ASDEX-Upgrade (West Germany), and TORE-SUPRA (France) tokamaks.

The following is a summary of the budget request for the four Toroidal Confinement Systems operating categories:

	FY 1985	FY 1986	FY 1987 Request
Tokamak Fusion Test Reactor........	$74,256	$67,974	$78,400

This budget will support the operation of TFTR, including the preparation for using ion cyclotron radio frequency heating to broaden the range of plasma parameters the machine can produce. It will continue preparation for FY 1989 tritium operations. In FY 1987 TFTR will have all of its subsystems operating at full capabilities, including the reliable operation of the long pulse neutral beam ion sources. The near term objectives of the TFTR program are to study the basic properties of high temperature, high density hydrogen and deuterium plasmas. In FY 1987, TFTR is expected to achieve plasma breakeven conditions, the condition under which a D-T plasma would generate power equal to the auxiliary input power. Understanding the fundamental mechanisms governing the behavior of plasmas at breakeven conditions (high temperatures and high densities) will be of vital importance in designing a successful burning plasma experiment or a future toroidal device. In FY 1987 and FY 1988, TFTR, in conjunction with the other large tokamak experiments in the world, will provide a valuable opportunity to probe the physics of well confined, high temperature plasmas. Following the successful operation at the breakeven level through FY 1988, TFTR is scheduled to perform deuterium-tritium experiments in FY 1989. In these experiments, TFTR is expected to make possible the first investigations of the effects of alpha particles on toroidal plasma confinement and stability.

At MIT, following the completion of experiments on the Alcator C device, a team of physicists will collaborate on the TFTR experiment. In FY 1987, TFTR will be producing copious amounts of experimental data, and the additional scientists from MIT will expedite the analysis of this data and enhance the efficiency of the TFTR program.

Base Toroidal Program..............	49,690	46,885	38,700

The base toroidal program provides support for experimental research and operation of the conventional tokamak confinement experiments for the development of improved operational tools and techniques. This includes the Doublet III-D and support of several collaborative efforts on foreign experimental machines. In FY 1987 at GA Technologies, Inc., this budget will support the operation of D-III-D to extend the experimental operating parameters of this facility. The major objective will be to explore the limits of high beta operation. Limited to hydrogen operation, at the high energy densities planned, Doublet III-D will produce fusion relevant plasma parameters to provide information on the physics of burning plasmas. The physics effort on D-III-D will be strengthened in FY 1987 by collaboration with a team of physicists from the LLNL following the completion of the TMX Upgrade experiments.

The D-III-D facility is also an important part of the U.S.-Japan international collaboration for research on fusion energy development. A collaboration agreement between the Japan Atomic Energy Research Institute (JAERI) and the Department of Energy (DOE) to conduct a joint research program on D-III-D will continue through FY 1988. Japanese scientists will participate directly in the Doublet III-D research program.

The FY 1987 plans for the Base Toroidal Program reflect a growing commitment to international collaboration, especially in the areas of plasma fueling, particle control, rf heating, and steady-state operation in toroidal configurations. The European and Japanese programs have tokamaks that are either operational or are in the process of being installed which have long pulse heating and plasma control systems that make them attractive for the investigations of these issues. Design, operation, and understanding of either a short pulse ignited plasma or a long pulse experimental test reactor will benefit from an increased understanding of impurity control and particle handling issues. These devices include TEXTOR and ASDEX-Upgrade in the Federal Republic of Germany, TORE SUPRA in France, and JET in England. Scientists from PPPL, MIT, ORNL, GA, Sandia and University of California, Los Angeles (UCLA) will participate in these international activities.

	FY 1985	FY 1986	FY 1987 Request
Advanced Toroidal Program..........	$15,239	$12,148	$27,161

The Advanced Toroidal Program supports experiments designed to study improvements to the conventional toroidal configuration. This includes the first full year of operation of the Advanced Toroidal Facility and the Princeton Beta Experiment. The emphasis of the Advanced Toroidal Facility (ATF) at Oak Ridge National Laboratory will be on understanding the physics of toroidal systems that use external helical windings (stellarators) rather than a current flowing in the plasma to create the confining magnetic field. ATF is designed to create a wide range of magnetic confinement geometries which are complementary to stellarator experiments in Germany and Japan. The main objective is to determine the maximum beta that can be obtained. Demonstrating that a high beta stellarator geometry exists would be significant because the stellarator is intrinsically a steady state toroidal fusion configuration.

At PPPL, this budget will support the initial operation of the Princeton Beta Experiment Upgrade (PBX-U). The PBX has demonstrated the highest beta achieved yet in a tokamak using a shaped plasma configuration. An upgrade of this device will be carried out in FY 1986-1987. This will allow the exploration of the regimes that theoretically allow even higher beta operation. Achievement of these high values of beta could lead to a significant improvement in the performance of the tokamak concept. This, in turn, could lead to a high power density tokamak reactor core. This budget will also support advanced physics studies of compact, high field ignition devices at PPPL, further tokamak modeling studies at PPPL, advanced toroidal studies at MIT, and initial physics studies of engineering test reactor concepts at LLNL of an international fusion facility in support of the President's initiative.

	FY 1985	FY 1986	FY 1987 Request
Major Device Fabrication............	$12,225	$14,495	$7,539

This budget will support the modification and upgrade of existing devices to enhance their capabilities to further research in areas suggested by theory and previous experiments.

At PPPL, the upgrading of PBX to PBX-M, which begins in FY 1986, will be completed in FY 1987.

The ATF facility at ORNL will be completed in the first quarter of FY 1987. At GA, procurement of the long pulse ion sources will be completed. Beamline modifications to accommodate the new sources will be completed in FY 1988.

(2) Mirror Confinement Systems............	54,805	47,168	25,700

The linear tandem mirror represents one of the two basic magnetic confinement configurations which has been shown to confine plasmas of fusion interest. The next appropriate step for the tandem mirror program would be the preparation for operation of the large scaling experiment, MFTF-B. However, recognition that the increasing stringencies in the federal budget will not support the originally planned operating costs for MFTF-B has led to a decision to focus the U.S. fusion effort on the toroidal program. As a result, the MFTF-B facility will be mothballed. Since there is mirror research abroad, an appropriate step is to work toward an international consensus on the best use of the MFTF-B facility in the overall world program. Future operation of the facility in an international context might be one outcome of such a planning activity. By early FY 1987, the fundamental physics of tandem mirrors will have been tested on TMX-U and TARA and work on these two devices will be completed. Most of the specialized personnel and material resources of these programs will then be applied to supporting the toroidal confinement systems. During the remainder of FY 1987 only the small exploratory Phaedrus device at the University of Wisconsin will be operated in the U.S. Collaboration with the Japanese mirror program will be continued in FY 1987.

Tandem Mirror Research Operations..	32,998	31,753	10,700

Of the requested funds, an amount of $1,600,000 will be used for the last year of Phaedrus operation and to continue the collaboration with the Japanese at a level of $600,000. The remainder ($8,500,000) will be used to bring the TMX-U and TARA experiments to a logical conclusion. Future operation of MFTF-B will await the availability of funds and possible international collaboration.

	FY 1985	FY 1986	FY 1987 Request
EBT Research Operations............	$ 900	$ 0	$ 0

Research operation support on the EBT concept was terminated in FY 1985.

Mirror Fusion Test Facility-B.......	20,400	15,300	15,400

The funding requested for FY 1987 provides for closeout of current fabrication activities and mothballing of the MFTF-B device. Future operation of this facility will await the availability of funds and possible international collaboration.

B. Capital Equipment..............................	15,808	16,329	7,100
(1) Toroidal Confinement Systems..........	11,402	12,228	7,100

The budget request of $7,100,000 for capital equipment funds provides for existing requirements for power supplies, diagnostic instruments, vacuum systems, data acquisition and analysis systems, and miscellaneous test and analysis equipment.

Of the total capital equipment funds, $3,500,000 is requested for TFTR at PPPL for a robotic maintenance manipulator required for limited D-T operation, diagnostic instrumentation, shielding blocks for diagnostics, vacuum systems, and data acquisition equipment including data storage devices; $2,000,000 is requested for D-III-D at GA Technologies, Inc., for power system switches, a data analysis computer, diagnostic equipment, data acquisition and control hardware, and cryogenic systems; $1,100,000 is requested for ATF at ORNL for vacuum pumps and valves, data acquisition equipment, and diagnostics instrumentation including spectrometers, lasers, and infrared detectors; and $500,000 is requested for PBX at PPPL for electronic components, vacuum systems, and diagnostics hardware.

(2) Mirror Confinement Systems..............	4,406	4,101	0

No funds are requested for FY 1987.

C. Development and Technology...........................	73,890	61,300	52,400

This subprogram provides for the development of the technologies needed for fusion experiments and for design and analysis of fusion systems. Elements in this subprogram support research on all four major technical issues in the development of magnetic fusion: the development of magnetic confinement systems, the physics of burning plasmas experiment, the development of nuclear technology and the development of fusion materials.

Recent progress in the Development and Technology subprogram area has included tests of three large superconducting magnets in the International Fusion Superconducting Magnet Test Facility (IFSMTF), operation of a multi-pellet pneumatic fuel injector on TFTR, successful demonstration of the long pulse

	FY 1986 Approp. (1)	General Reduction (2)	Management Initiatives (3)	Pay Cost Restoration (4)	General Reduction (5)	Rudman-Hollings (6)	Transfer/ Reprogramming (7)	Subtotal (8)	Comparability Adjustments (9)	Total (10)
Use of Prior Year Balances (Magnetic Fusion):										
Operating Expenses										
Capital Equipment										
Construction										
Total, Prior Year Bal. (Magnetic Fusion)										
Use of Prior Year Balances (Other Energy Supply):										
Operating Expenses										
Capital Equipment										
Construction										
Total, Prior Year Bal. (Other Energy Supply)										
Total, Magnetic Fusion Energy	$375,000				47	$-[illegible]		[illegible]		[illegible]
Operating Expenses	[illegible]				47	-[illegible]		[illegible]		[illegible]
Capital Equipment	[illegible]					-[illegible]		[illegible]		[illegible]
Construction	[illegible]					-487		[illegible]		[illegible]

neutral beam development source; development of new concepts for compact, high power R.F. launchers for plasma heating; increased confidence in vanadium as a reduced activation material; first results of steady-state erosion and deposition behavior changes using the Plasma Interactive Surface and Components Experimental System (PISCES); design studies of inexpensive copper magnet ignition devices, and definition of nuclear technology testing needs from the FINESSE study.

The Development and Technology budget decreases by $[illegible] in FY 1987. Program efforts are focused on the most critical technology issues. Programs in the areas of Plasma Technologies and Fusion Technologies are important to the successful performance of fusion scientific experiments and are key to understanding the potential of fusion systems to provide energy. Fusion Systems Analysis will continue the exploration of small copper magnet machine designs for ignition experiments and studies in support of the President's international fusion initiative. Existing international cooperative commitments will be fully met.

	FY 1985	FY 1986	FY 1987 Request
A. Operating Expenses..............................	[illegible]	[illegible]	[illegible]
(1) Plasma Technologies..........................	[illegible]	[illegible]	[illegible]

The FY 1987 budget for Plasma Technologies will continue to support programs that address the key technology issues associated with the components and systems which are used to magnetically confine and sustain high temperature fusion plasmas, but the breadth and depth will necessarily be reduced. The programs include the technologies involved in magnetics, plasma heating, and plasma fueling. The magnetics effort develops the technologies that will enable construction of reliable, cost-effective superconducting and copper magnets for producing the high magnetic fields required to hold and confine hot fusion plasmas. The plasma heating and fueling efforts develop the technologies and components to heat and sustain plasmas for current and future fusion experiments.

The Plasma Technologies development efforts have been extremely productive, resulting in significant technology spinoffs that have reached the commercial stage. The Plasma Technologies programs also provide very fertile ground for effective, cost saving international efforts. The IEA Large Coil Task, a major international effort on manufacturing and testing large superconducting magnet coils, continues. Substantial cooperative efforts are also underway in high field superconductors, low temperature materials testing, neutral beam and RF heating technology, and pellet fueling.

Magnetic Systems

The budget request for Magnetic Systems is $[illegible]. Overall, the magnetics effort is lower than FY 1986 because [illegible] of the [illegible], a fairly large cost in FY 1985 and the coil contract closeout and a [illegible] in FY 1986. In FY 1987, testing of the [illegible] array in the International Fusion Superconducting Magnet Test Facility (IFSMTF) will continue from its initiation in FY 1986 and will require a [illegible] support level to meet our international obligations to operate the IFSMTF until the test objectives have been successfully achieved. A minimum capability will be maintained on the superconducting technology effort since the availability of cost effective magnet designs, either for superconducting or normal systems is a prerequisite to decisions that will have to be made for the design and construction of any next step fusion device.

Heating and Fueling

The budget request for Plasma Heating and Fueling techniques is $9,850,000. The continued progress in experimental fusion plasma physics is directly attributable to the availability of equipment developed in plasma heating and fueling activities during the past several years. Experimentation in higher density and temperature regimes will necessitate higher power and possibly higher frequency electromagnetic wave sources, transmission components, and improved pellet fueling devices. For FY 1987, this budget will maintain essential efforts in these activities, but the remaining neutral beam development efforts will be phased out.

The positive ion neutral beam effort will be reduced to a level that provides support to operating experiments. The negative ion beam effort will be phased out and fusion will rely on the Space Defense Initiative (SDI) to cover this technology development since it is not needed for fusion development in the near term.

Development of radio frequency heating technology will continue with completion of tests on the Radio Frequency Test Facility (RFTF) of the compact, high power launcher and initiation of tests on Doublet-III/TFTR or Tore Supra. Development will focus on those wave launcher types that show the most promise for reliable long pulse operation in high temperature burning plasmas.

Electron Cyclotron Heating (ECH) of plasmas increases the stability of neutral beam and RF heated plasmas. The prime component of ECH systems is the gyrotron in which U.S. industry is the world leader in development and manufacture. Efforts in FY 1987 will be directed at innovative approaches to developing higher power, higher frequency versions of the gyrotron.

The plasma fueling effort is directed towards developing a tritium pellet injector which can produce pellets with a speed greater than the 1 to 2 kilometers/second achieved by the multiple shot injector for TFTR which will be placed in operation in FY 1986. The use of pellet injectors developed in the program during the past two years has enabled the exploration of high density plasmas in several devices and has resulted in stronger world-wide collaboration in fusion research.

	FY 1985	FY 1986	FY 1987 Request
(2) Fusion Technologies....................	$25,434	$32,700	$31,700

The objective of the Fusion Technologies category is to address the critical technology issues concerned with the effects on systems in contact with the plasma and in the neutrons produced by the plasma.

In FY 1987, the requested budget for Fusion Technologies will support three major sub-areas: (1) Fusion Nuclear Technology, (2) Fusion Materials, and (3) Environment and Safety.

The budget requested in FY 1987 will support the overall fusion technologies effort in selected areas consistent with the Magnetic Fusion Program Plan.

Fusion Nuclear Technology

The fusion nuclear technology budget request is $5,665,000. The objective of the Fusion Nuclear Technology element is to develop the major nuclear technologies needed for practical application of fusion energy. Fusion nuclear technology development is one of the key technical issues facing the magnetic fusion program. It addresses fusion systems which must deal with the effects of neutrons, electromagnetic radiation, and a radioactive environment created by fusion devices. The nuclear technology element include nuclear analysis methods, blankets, and tritium processing and control systems.

Activities in blankets will be limited to the most critical feasibility issues associated with the ability of blankets to perform their multiple functions of heat extraction, tritium production, and radiation shielding. In FY 1987, the most critical issue for liquid metal cooled blanket concepts, the effects of magnetic fields on coolant pressures and flows, will be studied experimentally. Major questions about the recovery of tritium from solid breeder materials will be addressed by tests in fission reactors.

Activities in tritium processing and control systems will address the fusion safety requirements for reliably processing, containing, and cleaning potential leakages of tritium generated in the blankets. In FY 1986, individual subsystems of the Tritium Systems Test Assembly (TSTA) at Los Alamos will be tested in preparation for limited full loop operation of TSTA in FY 1987.

An integral part of the Fusion Nuclear Technology element is a program which supports all of the above activities by providing the data bases and analytical methods needed to conduct the nuclear design and analysis of fusion devices. For example, a cooperative program with the Japanese that began in FY 1985 to develop methods for predicting the neutronics performance of tritium breeding materials in fusion reactors will be continued.

In FY 1987, focus will be on the detailed use of existing test facilities, the assessment of various fusion test facility options, and international collaboration in the development of test facilities for nuclear technology development.

Environment and Safety

The Environment and Safety budget request for FY 1987 is $1,400,000. This budget will support activities to develop an understanding of the environmental and safety concerns anticipated in present and future operational fusion facilities.

In the environmental area, work will continue to assess the environmental impacts of magnetic fusion energy devices. In the safety area, work will continue in the areas of tritium waste management, magnets, and the use of reduced activation materials to minimize environmental impacts of fusion.

Fusion Materials

The Fusion Materials budget request for FY 1987 is $13,725,000. The Plasma Materials and High Heat Flux programs provide for tritium permeation and inventory studies at Sandia National Laboratories (SNL), Livermore, CA, in support of the projected TFTR tritium program, full operation of the plasma/materials test facility at SNL, Albuquerque, NM, in support of TFTR coatings program and the upgraded RFP device, and continued operation of the PISCES facility at UCLA.

The program on radiation damage in materials will limit ongoing research on reduced activation materials. The scope of this program is limited to critical materials for fusion systems, including structural and blanket materials. Theory and modeling research in universities and laboratories will be strengthened.

The February 1982 U.S./Japan agreement on RTNS-II will be completed in FY 1987. Discussions will continue on Japanese support for program on high fluence materials radiation damage research in the HFIR fission reactors. Support will be maintained to complete modification of the HFIR fission reactor in order to reduce costs by the transfer of the experimental program from the ORR to HFIR.

	FY 1985	FY 1986	FY 1987 Request
(3) Fusion Systems Analysis...............	$14,040	$11,662	$10,000

The requested budget in this area will support system design studies of experimental machines with burning plasmas, an evaluation of innovative approaches to a test reactor, design concepts for advanced tokamak devices for electrical power production, and systems studies of reversed field pinch devices.

Studies of experimental devices that will be used to produce burning plasmas will be the primary focus of Fusion Systems Analysis in FY 1987. Studies of a tokamak with copper toroidal field coils for an ignition device will continue, based on work performed in FY 1986. The objective is to identify the most cost effective path to complete such an ignition experiment.

A second focus for the Fusion Systems Analysis area is design studies of an international fusion facility in support of the President's initiative for international collaboration in fusion. This request also supports the completion of a design study for a reversed field pinch device.

Support will continue for the International Tokamak Workshop (INTOR) being conducted by the International Atomic Energy Agency (IAEA) with the participation of the United States, the Soviet Union, European Community, and Japan.

	FY 1985	FY 1986	FY 1987 Request
B. Capital Equipment	$ 5,100	$ 4,330	$ 1,890

The FY 1987 requirements for capital equipment in the Development and Technology subprogram total $1,890,000, a decrease of $2,440,000 from the FY 1986 level, and are highlighted below:

(1) Plasma Technologies	3,386	2,309	680

The capital equipment request to support Plasma Technologies activities is $680,000, a reduction of $1,629,000 from FY 1986. Funds are requested to support the High Field Test Facility, the RF Test Facility, pellet injector development, RF development, and base technology efforts.

(2) Fusion Technologies	1,714	2,021	1,210

Capital equipment funds are requested to support the experimental research programs in materials, safety, and nuclear technology which include the Plasma Materials Test Facility (PMT), the Plasma Surface Interaction Experiment (PISCES), liquid metal test loop, tritium testing facilities, the Tritium Systems Test Assembly (TSTA), and for radiation facilities at the Oak Ridge Reactor as well as modification to the High Flux Isotope Reactor at Oak Ridge and for the Fast Flux Test Facility at Richland which are employed in the materials irradiation programs.

IV. Planning and Projects	48,501	21,982	16,800
A. Operating Expenses	12,201	5,528	4,780

A sum of $3,776,000 is requested to cover the program's legal obligation to support the Small Business Innovative Research (SBIR) program. The remainder is requested to support non-fusion landlord responsibilities for inventories at ORNL.

B. Capital Equipment	3,800	3,801	3,820

The FY 1987 request of $3,820,000 for capital equipment permits the purchase of general purpose equipment to support non-fusion specific landlord responsibilities at ORNL.

These funds will be used to replace obsolete or worn equipment as well as to provide new state-of-the-art equipment at the laboratory.

C. Construction	32,500	12,653	8,200

The FY 1987 construction budget request of $8,200,000 is entirely for general plant projects. These funds will support projects at several laboratories to meet health, safety, and programmatic requirements and to provide for miscellaneous modifications, additions, alterations, replacements and non-major new construction items to meet programmatic goals. This will allow us to provide continuity of operation, improvement to economy, minor changes in operating methods and protection of the Government's investment by preventing excessive deterioration of facilities. Of the total funding requested, $7,200,000 is provided to ORNL, $500,000 to PPPL, $200,000 to LLNL, and $300,000 to LANL. It is noted that at ORNL the Magnetic Fusion Energy program has the responsibility to provide funding for all of the general purpose plant needs for this multipurpose laboratory.

	FY 1985	FY 1986	FY 1987 Request
V. Program Direction..............................	$ 4,150	$ 3,608	$ 4,000
Total FTE's..................................	66	62	62

The FY 1987 request for Magnetic Fusion Energy Program Direction is $4,000,000. These funds are required to provide for personnel and other costs associated with continuation of 62 full-time equivalents.

The manpower base supported under this account provides the technical management expertise needed to direct and administer the highly scientific and technical research and development program in fusion energy. Staff activities include: policy development; preparation of technical research and development plans; assessment of scientific needs and priorities; development and defense of budgets; review, evaluation, and funding of research proposals; monitoring, evaluation, and direction of laboratory work and allocation of resources; implementation of university and industrial research programs, as well as construction projects; interagency and international liaison; and related administrative and program support activities.

Management improvements, such as increased use of office automation, assignment of some specific responsibilities to field offices and major mission assignments to laboratories, have been implemented in recent years to assist with certain workload requirements involved in managing this highly technical program. The recent shift in emphasis from construction to operation of fusion research test facilities has created increased workload in managing these facilities. Increased planning and both interlaboratory and international coordination are required to achieve effective utilization of existing major facilities and funding resources in addressing major technical and engineering issues. Updating the overall program plan and individual subprogram plans to reflect a significant redirection of effort in physics research and technology development is continuing. Support of the design and conceptual work on an ignition experiment and on the advanced concept initiatives begun in FY 1986 will continue.

The program is increasingly involved in international collaboration. This has expanded from a scientific exchange program with the Soviets to include major hardware cooperation programs with Japan and the European Community involving tens of millions of dollars annually and hundreds of scientists. Evaluation of current international activities is required to take advantage of opportunities for new cooperative programs and to avoid duplicative work. The Office of Fusion Energy staff must assure that both the content and the balance of the exchange programs are appropriate. Negotiations, intragovernmental liaison, and participation in international working groups dealing with both technical and managerial aspects of projects are very demanding of staff time.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
ENERGY RESEARCH

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

Advanced Toroidal Facility (ATF)
Oak Ridge National Laboratory

Total Estimated Cost (TEC): $19,900,000
(For Design and Construction)

Advanced Toroidal Facility (ATF)
Oak Ridge National Laboratory

Total Estimated Cost (TEC): $19,900,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years Obs.	FY 1985 Actual		FY 1986 Estimate		FY 1987 Estimate		Total Project Funding
		B/A	B/O	B/A	B/O	B/A	B/O	B/A
Fabrication								
Operating Expenses (DOE):								
Design and Construction	$ 8,025	$ 6,425	$ 6,768	$ 4,744	$10,389	$ 706	$ 863	$19,900
Subtotal	8,025	6,425	6,768	4,744	10,389	706	863	19,900
Related Funding Requirement								
Capital Equipment	950	218	66	0	0	0	0	1,168
Research Operations	2,365	626	802	155	221	0	0	3,146
Subtotal	3,315	844	868	155	221	0	0	4,314
Total Project	$11,340	$ 7,269	$ 7,636	$ 4,899	$10,610	$ 706	$ 863	$24,214

Description Objective and Justification

The existing ISX-B tokamak facility is being modified to test the physics of steady-state, high beta toroidal configurations, which potentially could provide significant advantages for proposed toroidal fusion reactors. The modified device, ATF, is intended to test beta limits and collisionless transport in a current-free steady-state stellarator/torsatron configuration.

Recent experimental results obtained in stellarators/torsatrons in Japan and Germany have renewed interest in the U.S. in utilization of helical windings to achieve steady-state operation of toroidal fusion reactors. The present stellarator devices are, however, relatively small with limited confinement capability. ATF is intended to test stellarator confinement and beta limits at a level comparable with tokamaks such as ISX-B and PLT. It will be the only major U.S. facility in the next few years to carry out experiments on stellarators.

Total Estimated Cost (TEC): $19,900,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification (continued)

The basic ATF device consists of a helical stellarator coil set, three vertical field coils, an ohmic heating system, and a vacuum vessel. Magnetic configuration flexibility, large cross section and good access are important design considerations. It will utilize a significant part of the existing ISX-B facilities, including power supplies, neutral beam systems, instrumentation and control systems, utilities, diagnostics, etc.

The conceptual design was conducted in FY 1983. The period from FY 1983 through FY 1986, inclusive, will be used for design (Title I and II Engineering) acceptance testing, procurement of the necessary hardware, and installation of the hardware.

(a) Schedule of Planned Activities

Activity	Start	Complete
Conceptual Design	4Q FY 1982	2Q FY 1983
Procurement	4Q FY 1983	4Q FY 1985
Final Design	4Q FY 1983	2Q FY 1986
Fabrication	3Q FY 1984	4Q FY 1986
Assembly	2Q FY 1985	1Q FY 1987
Startup	1Q FY 1987	

(b) Management and Contracting

A project manager was appointed using existing Martin Marietta Energy Systems, Inc. (MMES) procedures. Design was done by the MMES Engineering Division. Procurement will be through MMES's Purchasing Division using guidelines approved by DOE/ORO. Most items will be procured from outside vendors. A construction contractor will do site preparation and construction work using DOE/ORO guidelines.

(c) Prior Year Achievements

Title I and II design of all components including helical coils, vacuum vessel and structural shell are completed and contracts for procurements were placed. Prototype helical coil segment was fabricated and tested. The delivery of major components including helical field conductor and structural tee sets, structural shell segments, and vacuum vessel will be completed. Field assembly of the device will be initiated.

Advanced Toroidal Facility (ATF)
Oak Ridge National Laboratory

Total Estimated Cost (TEC): $19,900,000

[Tabular dollars in thousands. Narrative material in whole dollars.]

(d) Current Year Achievements

The assembly of the facility and its commissioning will be completed.

(e) Reasons for Increases and Decreases

The increase in the TEC from $19,300,000 to 19,900,000 is due to the added scope to the project. A new set of mid-vertical field coils were added to improve the flexibility of the facility.

(f) Cost Estimate

Engineering, Design and Inspection	$ 4,760
Procurement and Construction Costs	14,091
Contingency	1,049
Total	$19,900

Escalation is included at 6.5% per year.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
ENERGY RESEARCH

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

Field Reversed Configuration (FRC) Physics Experiment
Spectra Technology

Total Estimated Cost (TEC): $8,000,000
(For Design and Construction)

FRC Physics Experiment
Spectra Technology*

Total Estimated Cost (TEC): $8,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1986 Estimate		FY 1987 Estimate		FY 1988 Estimate		FY 1989 Estimate		Total Project Funding
	B/A	B/O	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Fabrication									
Operating Expenses	$ 1,075	$ 1,075	$ 2,425	$ 2,425	$ 3,050	$ 3,050	$ 1,450	$ 1,450	$ 8,000
Subtotal	1,075	1,075	2,425	2,425	3,050	3,050	1,450	1,450	8,000
Related Funding Requirement									
Research Operations	1,120	1,120	1,475	1,475	1,055	1,055	500	500	4,150
Subtotal	1,120	1,120	1,475	1,475	1,055	1,055	500	500	4,150
Total Project	$ 2,195	$ 2,195	$ 3,900	$ 3,900	$ 4,105	$ 4,105	$ 1,950	$ 1,950	$12,150

Description, Objective and Justification:

The term field reversed configuration (FRC) refers to a special class of elongated toroidal plasma equilibria contained in a solenoidal magnetic field; the magnetic field is purely poloidal. Technological advances and increased understanding of FRC physics and formation processes have resulted in rendering the FRC a unique and promising approach to fusion power. Its promise arises from the extremely high beta values (of order unity) and its observed ruggedness.

The objective of this experiment is to achieve conditions at which fusion-relevant confinement and stability can be tested. This objective is characterized by a parameter S-the average number of ion orbits between the center and edge of the plasma. Present experiments operate at S of 2-3. Immediate extrapolation to the reactor-required S of 30 would be costly. However, theoretical predictions show that at S = 8 conditions are achieved similar to those encountered in a fusion plasma, and this value has been chosen as a cost-effective near term goal.

The hardware required to meet the experimental objectives are: large diameter plasma discharge tube, vacuum vessel and accompanying support structure, high voltage power supply banks, and ignition switches for capacitors. There will also be costs related to space preparation. The experiment will be designed to achieve a plasma condition of 64-cm-diam, 200-cm length, 3.5 X 10^{15} cm^{-3} particle density, 350 eV temperature, energy confinement time of 2 milliseconds, and fusion Lawson parameter of 2 X 10^{12} $sec\text{-}cm^{-3}$.

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*This project will be constructed at Spectra Technology which is non-Government owned property.

FRC Physics Experiment
Spectra Technology

Total Estimated Cost (TEC): $8,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(a) Schedule of Planned Activities

Activity	Start	Completion
Device Design	3Q FY 1986	2Q FY 1987
Fabrication and Installation	4Q FY 1986	2Q FY 1989
Begin Operations	3Q FY 1989	Indefinite

(b) Management and Contracting

The technical requirements and experimental objectives have been established during a technical planning effort with experts in the field reversed configuration topical area. Outside reviews have supported the timing and confirmed the experimental objectives. The contractor is Spectra Technology in Bellevue, Washington.

(c) Prior Year Achievements

Technical proposal for project was reviewed and pre-conceptual design, project approach and program goals were accepted.

(d) Current Year Achievements

A contract will be negotiated and the project management team will be established. Final cost and schedule projections will be completed after a final project review is conducted in the first quarter of FY 1987.

(e) Reasons for Increases and Decreases

Total estimated cost (TEC) has been reduced from the $9,700,000 requested in the FY 1986 Congressional budget to the $8,000,000 contained herein. The device size and energy storage requirements have been reduced as a result of the technical review of the proposal.

FRC Physics Experiment
Spectra Technology

Total Estimated Cost (TEC): $8,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(f) Cost Estimate (Cost estimate is preliminary)

Engineering and Design	$ 1,100
Procurement and Fabrication	4,000
Assembly and Installation	1,700
Contingency	1,200
Total	$ 8,000

Escalation is included at 5% per year.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
ENERGY RESEARCH

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

Reversed Field Pinch
Los Alamos National Laboratory (LANL)

Total Estimated Cost: $32,300,000
(For Design and Construction)

Reversed Field Pinch
Los Alamos National Laboratory

Total Estimated Cost: $32,300,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1986 Estimate		FY 1987 Estimate		FY 1988 Estimate		FY 1989 Estimate		FY 1990 Estimate		Total Project Funding
	B/A	B/O	B/A	B/O	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Fabrication											
Operating Expenses	$ 3,420	$ 3,220	$ 6,600	$ 6,400	$ 8,680	$ 8,680	$ 9,700	$ 9,700	$ 3,900	$ 4,300	$32,300
Subtotal	3,420	3,220	6,600	6,400	8,680	8,680	9,700	9,700	3,900	4,300	32,300
Related Funding Requirement											
Research Operations	915	915	1,400	1,400	485	485	0	0	0	0	2,800
Capital Equipment	3,647	3,647	3,000	3,000	2,153	2,153	2,400	2,400	6,200	6,200	17,400
Subtotal	4,562	4,562	4,400	4,400	2,638	2,638	2,400	2,400	6,200	6,200	20,200
Total Project	$ 7,982	$ 7,782	$11,000	$10,800	$11,318	$11,318	$12,100	$12,100	$10,100	$10,500	$52,500

Description, Objective and Justification

The presently operating reversed field pinch (RFP) devices have achieved outstanding experimental results which surpass design specifications for the devices. For example, in ZT-40M, experimental duration has reached 25 milliseconds exceeding the design goal of 2 millisecond. During the recent review of certain fusion development issues, the Magnetic Fusion Advisory Committee recommended proceeding with the physics exploration of the reversed field pinch concept. The importance of extending the current capability to values in the megampere range in order to test energy confinement was emphasized. As a result, a device will be fabricated which will have an initial current performance of 2 megampores (MA) with subsequent increase to 4 MA. This will bring to the fusion program an experimental capability that increases first wall heat flux, provides information on tokamak-like operating modes, high magnetic field shear, physics of MHD beta limits, and MHD minimum energy states.

Reversed Field Pinch
Los Alamos National Laboratory

Total Estimated Cost: $32,300,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification (continued)

The device will consist of magnetic field coils, vacuum system, control system, and structural support systems. Related project funding will provide a power supply system from capital equipment funds and the required physics and engineering support from operating expense funds. The initial capability of the device will be 2 megamperes of current, but the device will be upgradable using additional power supply systems to achieve 4 MA. Technical goals will include minimization of magnetic field errors, design of plasma limiters for high heat flux, first-wall thermal loading (1.5 to 5 MW/m^2), and steady state operational capabilities.

The funding profile shown will allow fabrication to begin in FY 1986, and construction to be complete in CY 1989.

(a) Schedule of Planned Activities

Activity	Start	Complete
Device Design	1Q FY 1986	2Q FY 1987
Procurement	2Q FY 1986	1Q FY 1989
Fabrication and Installation	3Q FY 1986	1Q FY 1990
Plasma Operations	2Q FY 1990	Indefinite

(b) Management and Contracting

The Los Alamos National Laboratory (LANL) has been assigned responsibility for this project. The LANL management team is being organized and is expected to be complete by the third quarter of FY 1986. An objective of the RFP program is to involve other U.S. institutions that have skills needed for RFP development. To achieve this end, a competitive solicitation is to be accomplished during FY 1986. This solicitation will seek to attract parties interested in a cost shared joint participation in this project. Representatives from such a participant shall be expected to participate fully in the project management.

(c) Prior Year Achievements

Technical proposal for the project was reviewed, and pre-conceptual design, project technical approach and program goals were established. This included the recommendation to incorporate certain changes in the initial hardware that make it capable of 4MA operations. This includes the immediate acquisition of a single motor-generator adequate for the ultimate capability.

Reversed Field Pinch
Los Alamos National Laboratory

Total Estimated Cost: $32,300,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(d) Current Year Achievements

A contractor and site has been selected and the project management team is being organized. The Los Alamos National Laboratory has been assigned responsibility for this project. It will be sited in the target chamber hall of the Antares facility at LANL. Final cost and schedule projections will be completed during the third quarter of FY 1986.

(e) Reasons for Increases and Decreases

The decision to provide partially for the 4 megampere plasma current capability resulted from an examination of the world-wide reversed field pinch program and the guidance provided during the FY 1986 appropriation process. This decision affects only slightly the cost and schedule to achieve the 2 megampere operation described in the FY 1986 budget submission. The full 4 megampere current capability will be provided by the fourth quarter of FY 1991. The procurement items called for in FY 1990 are predominantly additional power conversion equipment needed for the higher current capability.

(f) Cost Estimate (Cost estimate is preliminary)

Engineering and Design	$ 5,100
Procurement and Fabrication	20,400
Assembly and Installation	4,600
Contingency	2,200
Total	$32,300

Escalation is included at 5% per year.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
ENERGY RESEARCH

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

DIII-D Extended Pulse Neutral Beams
GA Technologies, Inc.

Total Estimated Cost: (TEC) $7,400,000
(For Design and Construction)

DIII-D Extended Pulse Neutral Beams
GA Technologies, Inc.*

Total Estimated Cost (TEC): $7,400,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years Obs.	FY 1986 Estimate		FY 1987 Estimate		FY 1988 Estimate		Total Project Funding
		B/A	B/O	B/A	B/O	B/A	B/O	B/A
Fabrication:								
Operating Expenses	$ 0	$ 2,371	$ 2,371	$ 3,000	$ 3,000	$ 2,029	$ 2,029	$ 7,400
Subtotal	0	2,371	2,371	3,000	3,000	2,029	2,029	7,400
Total Project	$ 0	$ 2,371	$ 2,371	$ 3,000	$ 3,000	$ 2,029	$ 2,029	$ 7,400

Description, Objective and Justification

The Doublet III facility with the new Dee-shaped vacuum vessel installed (DIII-D) will be the U.S. fusion program's most flexible tokamak facility with a performance capability in hydrogen approaching that of TFTR and JET. DIII-D will operate at lower magnetic field than TFTR, but with a plasma shaping capability that is more flexible than that of JET. The toroidal program plans to rely heavily on DIII-D through the 1980's to provide the information necessary to understand the physics of shaped plasmas with parameters approaching those of fusion plasmas. To fulfill its role in the toroidal program it will be necessary for the DIII-D facility to extend its pulse length to several seconds. Longer pulse heating is required to bring the larger DIII-D plasma to equilibrium and then to study the stability of that high beta equilibrium. Also, many of the physics phenomena of interest evolve over a period of several seconds.

The DIII-D facility, as presently planned, will be capable of multisecond plasma discharges but will lack a multisecond plasma heating capability. This project will provide for the upgrade of the four existing neutral beam injection systems for 5 second operation and 14 MW of injected power. Two of the neutral beam injection systems were provided by JAERI through the U.S./Japan cooperative program on D-III. This project will allow high quality plasma parameters to be sustained for up to 10 seconds. This is the most cost effective means of obtaining this level of auxiliary heating capability.

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*This project will be constructed at GA Technologies, Inc., which is non-Government owned property.

DIII-D Extended Pulse Neutral Beams
GA Technologies, Inc.

Total Estimated Cost (TEC): $7,400,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification (continued)

The extended pulse heating will allow the plasma temperature in DIII-D to be increased into the low collisionality regime and sustained for several seconds providing sufficient time for detailed investigations to be conducted. As the plasma discharge approaches the collisionless regime, its characteristics are theoretically predicted to change. The transport is altered, therefore, the confinement properties are changed. In addition, the plasma pressure is elevated, producing changes in the MHD activity and the stability of the plasma configuration. The physics of this regime have been studied theoretically, but definitive experiments have not been possible because the proper plasma conditions could not be achieved. Experiments conducted with DIII-D using the modified neutral beam injection systems are expected to greatly expand our scientific knowledge of this regime.

During 1987, work will be completed on modification of the two neutral beam injection systems for five second operation. Procurement of the new long pulse ion source will be completed and operation of two modified beamlines will begin.

(a) Schedule of Planned Activities

Activity	Start	Complete
Design	1Q FY 1986	3Q FY 1986
Fabrication	2Q FY 1986	2Q FY 1987
Installation	3Q FY 1986	3Q FY 1987
Startup	4Q FY 1986	2Q FY 1988

(b) Management and Contracting

This project will be managed by GA Technologies, Inc., San Diego, California, under separate contract.

(c) Prior Year Achievements

One neutral beam injection system was modified for five second operation. Two long pulse ion sources were procured and installed in the first beam line and tested at full power.

DIII-D Extended Pulse Neutral Beams
GA Technologies, Inc.

Total Estimated Cost (TEC): $7,400,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

(d) Current Year Expectations

Modify a second beamline and procure the remaining seven long-pulse ion sources.

(e) Reasons for Increases and Decreases

The cost estimate for the long-pulse ion source procurement from RCA has increased. The project completion date has been postponed because of budget reductions.

(f) Cost Estimate

Engineering and Design	$ 800
Fabrication and Installation	5,700
Contingency	900
	$ 7,400

Escalation is included at 5% per year.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT - PLANT AND CAPITAL EQUIPMENT
MAGNETIC FUSION
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: General plant projects

2. Project No.: 87-R-901

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3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 2nd Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: None
Date:

6. Current cost estimate: $8,200
Date: December 1985

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7. Financial Schedule:

Fiscal Year	Obligations	Costs FY 1985	Costs FY 1986	Costs FY 1987	Costs After FY 1987
Prior Year Projects	XXXXXXXX	$ 4,245	$ 3,479	$ 2,862	$ 0
FY 1985 Projects	$ 9,400	3,255	4,330	1,815	0
FY 1986 Projects	8,764	0	2,697	4,099	1,968
FY 1987 Projects	8,200	0	0	2,711	5,489
		$ 7,500	$ 10,306	$ 11,487	$ 7,457

8. Brief Physical Description of Project

These projects provide for the many miscellaneous alterations, additions, modifications, replacements, and non-major new construction items required annually to provide continuity of operation, improvement in economy, road and street improvements, elimination of health and safety hazards, minor changes in operating methods, and protection of the Government's significant investment in facilities at the present time. The continuing review of our requirements will result in some of the projects being changed in scope; it will also result in other projects being added to the list with the necessary postponements of some now listed, all depending on conditions or situations not apparent at this time.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects 2. Project No.: 87-R-901

8. Brief Physical Description of Project (continued)

The currently estimated distribution of FY 1987 funds by office is as follows:

1. Los Alamos National Laboratory	$ 300
2. Lawrence Livermore National Laboratory	200
3. Princeton Plasma Physics Laboratory	500
4. Oak Ridge National Laboratory	7,200
	$ 8,200

9. Purpose, Justification of Need for, and Scope of Project

The following are tentative examples of the major items to be performed at the various locations:

Los Alamos National Laboratory	$ 300

Requirements include laboratory and office modifications, and additions and upgrading of building service systems as required to meet programmatic goals of the Magnetic Fusion Energy program.

Lawrence Livermore National Laboratory	$ 200

NMFECC Tape Vault

Princeton Plasma Physics Laboratory		$ 500*
Safety and fire protection improvements, system modifications and alterations.	100	
Repair by replacement CICADA HVAC units	350	
Miscellaneous small projects	50	

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*These projects will be constructed at the Princeton Plasma Physics Laboratory which is non-Government owned property.

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

SUPPORTING RESEARCH AND TECHNICAL ANALYSIS

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DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

SUPPORTING RESEARCH AND TECHNICAL ANALYSIS

Developing new and improving the use of current energy sources continues to be of fundamental importance to the general health and welfare of the nation and its economy. The role of supporting research and technical analysis is to expand the scientific and engineering knowledge base on which the Nation's future energy options depend and to provide independent, objective analyses and assessments of research and technical needs relating to energy. The applied technology efforts of industry and government need this broad knowledge base to devise new concepts, develop new materials, and devise new and improved processes and techniques for energy production, conversion and utilization. We must continue to strengthen our understanding of the scientific basis of energy-related phenomena to overcome limitations on productivity growth, erosion of the country's competitive position with foreign nations and additional pressure on the United States balance of trade.

Seven programs comprise the Office of Energy Research's portion of the Supporting Research and Technical Analysis category of the agency's budget: (1) Basic Energy Sciences (BES); (2) Energy Research Analysis (ERA); (3) Advisory and Oversight Program Direction; (4) University Research Support (URS); (5) University Research Instrumentation (URI); (6) Multiprogram Energy Laboratories Facilities Support (MEL-FS); and (7) Policy and Management.

The mission of the Basic Energy Sciences (BES) program is to carry out long range, basic research activities needed to enhance this base. The major product of the BES program continues to be increased knowledge which becomes a part of the body of data on which applied technologies rest. In addition to a major focus on disciplinary research, there is also emphasis on innovative applications of new knowledge to energy problems, and on the early application of the results. In support of these activities, the BES program provides the major support for operating the large, unique scientific user facilities required for research in the physical and life sciences.

The U.S. has been the world leader in science and technology and has derived many economic benefits from its leadership. The Department of Energy and its multiprogram laboratories play an important role in the nation's scientific enterprise that is essential for our preeminence. A central feature of this role has been the construction and operation of large, specialized scientific facilities that are used by scientists from universities and industry as well as the national laboratories. Many of the scientific facilities in our multiprogram laboratories are old or are becoming old and their scientific productivity will soon become marginal. In order to make further progress in certain fields, new, more powerful facilities are required.

In the past few years, the Department has given special attention to correcting deficiencies at its laboratories in environment, health, safety, security, safeguards, multiprogram general purpose facilities and other such areas. However, less attention has been paid to improving the essential scientific facilities required to accomplish the main mission of the laboratories, i.e., to be preminent in certain key fields of research. In 1987 a Scientific Facilities Upgrade, directed toward solving this problem will be initiated. It includes four facilities that have been identified by the scientific community as being the most critical to the future needs of the Department's basic research programs. The four facilities, all of which will

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects

2. Project No.: 87-R-901

9. Purpose Justification of Need for, and Scope of Project (continued)

Oak Ridge National Laboratory .... $ 7,200

These funds cover the Magnetic Fusion Energy program's responsibility to fund all of the generic General Purpose Plant projects needs at this multipurpose laboratory.

Air Conditioning Central Mechanical Shops	$	160
Laboratory Improvements, Biology Administration and Research Building		200
Replace Elevator 2, Biological Research Facility		450
East Parking Lot Lighting Replacement		125
Radiochemical Reprocessing Plant-Evacuation Alarms and Remote Monitoring		95
Fire Protection Installation, Central Research Library		60
Steam Plant Storage Building		52
Computer Science Research Facility		985
Toxic Substance Inhalation Facility		700
Backup Tape Storage Vault		180
New Facilities for Safety, Security, and Efficiency		100
Radiochemical Reprocessing Plant Public Address and Intercom System		255
Separation Science and Technology Facility		650
High Bay Engineering Offices and Laboratories		470
Switchgear Modernization, Biology Research Laboratory Building		830
Facility Upgrade		658
Balance Negative Air Pressure, Fusion Energy Administration, Research Building		280
Containment, Ventilation, Air Routing and Control Systems		950

Since needs and priorities may change, other projects may be substituted for those listed, and some of these may be located on non-Government owned property.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects   2. Project No.: 87-R-901

10. Details of Cost Estimate

Not available at this time.

11. Method of Performance

Design and engineering will be on the basis of negotiated subcontracts and construction work under fixed price subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

This item does not apply to general plant projects.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

This item does not apply to general plant projects.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
OPERATING EXPENSE FUNDED PROJECT DATA SHEET
ENERGY RESEARCH

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

PBX Upgrade
Princeton Plasma Physics Laboratory

Total Estimated Cost: $9,200,000
(For Design and Construction)

PBX Upgrade
Princeton Plasma Physics Laboratory*

Total Estimated Cost: $9,200,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Actual		FY 1986 Estimate		FY 1987 Estimate		Total Project Funding
	B/A	B/O	B/A	B/O	B/A	B/O	B/A
Fabrication							
Operating Expenses	$ 0	$ 0	$ 5,367	$ 5,367	$ 3,833	$ 3,833	$ 9,200
Subtotal	0	0	5,367	5,367	3,833	3,833	9,200
Total Project	$ 0	$ 0	$ 5,367	$ 5,367	$ 3,833	$ 3,833	$ 9,200

Description, Objective and Justification

The presently operating PBX will be modified to allow for increased beta operation in high aspect ratio tokamaks. The upgrade will include reconfiguring the pusher coil to produce higher indentation H-mode operation and adding passive stabilizer plates to control disruptions attributed to external kink modes. The goal is to achieve the highest possible beta operation since beta is a direct measure of the efficiency of magnetic field utilization.

To date all tokamak maximum beta values have been determined by the Troyon limit, which states that beta is proportional to plasma current and inversely proportional to plasma radius and toroidal magnetic field. PBX Upgrade seeks to exceed this theoretical first stability regime limit by indenting the plasma, thereby suppressing the internal kink and ballooning modes. By means of shaping the plasma and passively stabilizing the instabilities, PBX Upgrade should be able to demonstrate whether or not access can be gained to the region of second stability and the correspondingly higher beta values.

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*The project will be constructed at the Princeton Plasma Physics Laboratory which is non-Government owned property.

PBX Upgrade
Princeton Plasma Physics Laboratory

Total Estimated Cost: $9,200,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification (continued)

(a) Schedule of Planned Activities

Activity	Start	Complete
Conceptual Design	1Q FY 1985	1Q FY 1986
Stop PBX Operation	1Q FY 1986	
Fabrication of Parts	2Q FY 1986	1Q FY 1987
Installation of Plates and Coils	3Q FY 1986	1Q FY 1987
Start PBX-Upgrade Operation	2Q FY 1987	

(b) Management and Contracting

This project will be managed by PPPL, Princeton, New Jersey.

(c) Prior Year Achievements

Engineering design was completed. Fabrication and installation of the passive plates, pusher coil, and modification of power supplies and diagnostics commenced.

(d) Current Year Achievements

The upgrade will be completed in the second quarter of FY 1987. Full scale operation will begin in the third quarter of FY 1987.

(e) Reasons for Increases and Decreases

N/A

PBX Upgrade
Princeton Plasma Physics Laboratory

Total Estimated Cost: $9,200,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification (continued)

(f) Cost Estimate (Cost estimate is preliminary)

Engineering and Design	$ 2,000
Fabrication	6,000
Contingency	1,500
Total	$ 9,500

be located at the multiprogram laboratories, are: a 1-2 GeV Synchrotron Radiation Source - Lawrence Berkeley Laboratory, a 6 GeV Synchrotron Radiation Source - Argonne National Laboratory, an Advanced Steady State Research Reactor - Oak Ridge National Laboratory; and a Relativistic Heavy Ion Collider - Brookhaven National Laboratory.

The Energy Research Analysis (ERA) program provides the capability for independent, rigorous assessment of the base of research that underlies a variety of energy technologies. Assessments are consolidated under one organization, the Office of Energy Research, in fulfillment of legislated responsibility for the Director of Energy Research to advise the Secretary on the agency's research and development programs.

The University Research Support (URS) program consists of two major subprograms and a set of program activities focused on the following three primary objectives: (1) to strengthen university capability to do energy research; (2) to strengthen the quality and increase the number of students interested in pursuing energy-related professional careers; and (3) to enhance technology transfer activities through cooperative research efforts between universities, the agency's national laboratories and private industry. The first subprogram, University Laboratory Research, is directed at strengthening the capabilities of both universities and national laboratories as major energy research performers in the conduct of long range energy research. Many of the activities supported within this subprogram involve joint efforts between university and laboratory-based researchers. The second subprogram, Energy Manpower Development, includes efforts to increase the number of students pursuing energy-related engineering and science careers. This subprogram also includes the Department's statutory responsibility for assessing the supply and demand of manpower for both current and projected energy R&D programs.

The University Research Instrumentation (URI) program provides grants to major research universities to purchase state-of-the-art, scientific instrumentation used in energy-related research areas such as materials characterization, biological research, catalysis, health effects, and engineering research.

The Multiprogram Energy Laboratories-Facilities Support (MEL-FS) Program is to provide for the rehabilitation, upgrade, and replacement of general purpose facilities at the five multiprogram energy laboratories: Argonne National Laboratory (ANL), Brookhaven National Laboratory (BNL), Lawrence Berkeley Laboratory (LBL), Oak Ridge National Laboratory (ORNL), and Pacific Northwest Laboratory (PNL). These Government-owned sites are complete research reservations with unique research facilities including laboratories and offices and all necessary support facilities and systems such as administrative offices, craft shops, warehouses, security facilities, fire houses, cafeterias, and all required utility distribution systems plus steam generation plants, sewage and other waste treatment facilities, roads and other structures. These laboratories have performed national research programs for the Department and its predecessor agencies for nearly 40 years and continue to do so primarily in the areas of energy supply research and development and general sciences research (e.g., nuclear energy, fusion energy, basic energy sciences, nuclear physics, high energy physics, life sciences, fossil energy, solar energy and conservation.) Over 17,000 scientists, engineers and other support staff are engaged in these activities.

The MEL-FS program consists of two subprograms. The first subprogram, Multiprogram Energy Laboratories-General Purpose Facilities (MEL-GPF) originated in FY 1981 to rehabilitate, upgrade, and replace as appropriate deficient buildings, utilities, roads, railroads and other facilities at the multiprogram laboratories. This is necessary because through continuous use, aging and changing technology, facilities and related support systems deteriorate (both physically and in performance) to a point where they are no longer appropriate for their intended functions, economically justifiable to maintain, or adequate to meet security, environmental, safety, and health requirements. Thus, this program helps ensure that the capital asset base is adequate for continued effective accomplishment of the Department's R&D mission today and in the future.

The ORNL Environmental Compliance Upgrade Subprogram originated in FY 1985 to address environmental deficiencies that relate to non-defense activities at ORNL. The actions fall into two categories: those that concern the modification, replacement or upgrade of existing processes for handling wastes and those that relate to the clean-up of inactive contaminated facilities and sites. A multiyear effort will be needed to bring ORNL's active and inactive systems into compliance with existing applicable environmental regulations.

Advisory and Oversight Program Direction provides funds for the personnel resources required by the Director of Energy Research to carry out his responsibilities specifically assigned by legislation (P.L. 95-91), as well as those mandated by the Secretary of the Department of Energy, in areas beyond the scope of the Office of Energy Research programs. This staff has the responsibility to advise the Secretary with respect to the well-being and management of the multiprogram laboratories; to administer the Department's R&D Laboratory Technology Transfer Program; to supervise or support research activities carried out by any of the Assistant Secretaries; to provide for institutional planning by the Multiprogram Laboratories; and to provide for program management of the Energy Research Analysis, University Research Support, and Multiprogram Energy Laboratories-Facilities Support programs. The program provides funds only for the salaries and related personnel expenses for the personnel who carry out the studies, analyses, monitoring and coordination activities required to support the Director of the Office of Energy Research and the Secretary.

The Office of Energy Research Policy and Management program provides for the salaries and related expenses associated with staff in the immediate office of the Director of Energy Research.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
BASIC ENERGY SCIENCES

Energy Supply Research and Development - Operating Expenses
Energy Supply,Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Basic Energy Sciences					
Materials Sciences					
Operating Expenses..........	$132,227	$134,248	$134,248	$156,931	$+22,683
Capital Equipment...........	15,450	11,979	11,979	15,500	+ 3,521
Construction................	36,580	42,333	42,333	23,960	-18,373
Subtotal..................	$184,257	$188,560	$188,560	$196,391	$+ 7,831
Chemical Sciences					
Operating Expenses..........	78,592	78,123	78,123	86,419	+ 8,296
Capital Equipment...........	8,840	8,506	8,506	9,555	+ 1,049
Construction................	5,550	5,609	5,609	5,430	- 179
Subtotal..................	92,982	92,238	92,238	101,404	+ 9,166
Nuclear Sciences					
Operating Expenses..........	39,641	41,445	41,445	46,913	+ 5,468
Capital Equipment...........	2,950	2,457	2,457	2,930	+ 473
Construction................	300	1,251	1,251	150	- 1,101
Subtotal..................	42,891	45,153	45,153	49,993	+ 4,840
Applied Mathematical Sciences					
Operating Expenses..........	34,467	37,925	37,925	32,785	- 5,140
Capital Equipment...........	1,500	1,030	1,030	1,100	+ 70
Construction................	0	4,811	4,811	0	- 4,811
Subtotal..................	35,967	43,766	43,766	33,885	- 9,881
Engineering and Geosciences					
Operating Expenses..........	26,085	25,571	25,571	29,412	+ 3,841
Capital Equipment...........	1,500	1,443	1,443	1,750	+ 307
Construction................	0	7,698	7,698	0	- 7,698
Subtotal..................	27,585	34,712	34,712	31,162	- 3,550
Advanced Energy Projects					
Operating Expenses..........	10,048	7,286	7,286	8,932	+ 1,646
Capital Equipment...........	320	308	308	330	+ 22
Subtotal..................	10,368	7,594	7,594	9,262	+ 1,668
Biological Energy Research					
Operating Expenses..........	12,360	11,960	11,960	14,538	+ 2,578
Capital Equipment...........	560	515	515	610	+ 95
Construction................	0	5,773	5,773	0	- 5,773
Subtotal..................	12,920	18,248	18,248	15,148	- 3,100
Program Direction					
Operating Expenses..........	3,830	3,499	3,499	4,125	+ 626
Subtotal..................	3,830	3,499	3,499	4,125	+ 626

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Total					
Operating Expenses.......	$337,250	$340,057	$340,057	$380,055	$+39,998
Capital Equipment........	31,120	26,238	26,238	31,775	+ 5,537
Construction.............	42,430	67,475	67,475	29,540	-37,935
Basic Energy Sciences......	$410,800 a/b/c/	$433,770 c/d/e/	$433,770 c/d/	$441,370 c/	$+ 7,600
Staffing Total FTE's.......	63	69	63	63	

Authorization: Section 209, P. L. 95-91

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a/ Total does not include $3,350,000 transferred to SBIR program.

b/ FY 1985 total reflects a reduction of $2,940,000 for ADP general reduction.

c/ Totals reflect a reduction of $11,655,000 in FY 1985, $10,110,000 in FY 1986, and $11,000,000 in FY 1987 for management initiative savings.

d/ Total reduced by $17,041,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

e/ A deferral of $38,489,000 is being proposed.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Basic Energy Sciences
(dollars in thousands)

1986 Appropriation enacted	$450,811
1986 Gramm-Rudman reduction	- 17,041
1986 adjusted	433,770
Program increases and decreases:	
- Maintains the key elements of the research efforts underway. New research must come at the expense of ongoing programs	+25,994
- Essential facility support continued (i.e., safeguards and security, electric power, inventories, etc.); facility demand will continue to exceed capability	+ 8,504
- Research and development funding provided in support of the next generation of facilities needed to continue U.S. leadership in key scientific areas	+ 5,500
- Permits principal capital equipment commitments for normal replacements and facility requirements	+ 5,537
- Provides construction funding for ongoing projects nearing completion and for architect engineering and long-lead procurement for the 1-2 GeV Synchrotron Radiation Source	-37,935
1987 budget request	$441,370

Overview

For FY 1987, the request for the Basic Energy Sciences (BES) program is $441,370,000: $380,055,000 in operating funds, $31,775,000 in equipment funds, and $29,540,000 in construction funds.

Support for long range basic research is an important responsibility of the Federal Government. The extent of private sector activity in this domain has been limited mainly to a few large corporations with sufficient breadth and ability to support the facilities and infrastructure peculiar to basic research. The private sector activity, however, has been declining while industry is, at the same time, turning more and more to Federal laboratories and universities as sources of new ideas. Thus the BES program, a primary source of Federal funding for basic research, is finding a new and dynamic role in the conduct of R&D in the U.S. today. This role includes continuing the design and construction of expensive, unique major research facilities and support of their operations. National security, U.S. leadership in science and technology, and training technical manpower all are effectively served by a continuing vigorous basic research activity.

New technologies and improvements in existing technologies result from the innovative application of new scientific knowledge and concepts. It is crucial for the U.S. to maintain its scientific base; this requires continued funding of basic research serving the different energy supply and conservation options as well as U.S. science in general. It has become increasingly important for the U.S. to disseminate research results to the private sector and to participate in the effective exploitation of these results to benefit the U.S. economy. In FY 1984, for example, a major new materials initiative was started that not only attempts to deal with advanced materials research, but also with more effective communications and interactions with U.S. industry and training new researchers.

Basic Energy Sciences has a heavy involvement in large scientific facilities (e.g., the High Flux Beam Reactor and National Synchrotron Light Source at Brookhaven National Laboratory, the Combustion Research Facility at Sandia-Livermore, the High Flux Isotope Reactor and the Oak Ridge Electron Linear Accelerator at Oak Ridge National Laboratory, and high voltage and atomic resolution microscopes at several sites). Many areas of modern science require large and costly facilities; without them, the necessary advanced research could not be done. The large, expensive, unique facilities in the BES program are made available to the entire U.S. scientific community to the extent that funds permit. BES also is providing advanced state-of-the-art computational support for several Energy Research programs other than Magnetic Fusion Energy (which is directly supported by the National Magnetic Fusion Energy Computer Center (NMFECC)): High Energy and Nuclear Physics, and Biological and Environmental Research. Computational support, provided through the Applied Mathematical Sciences subprogram relies on an enhanced class VI computer system installed during FY 1985 at Lawrence Livermore National Laboratory; it is accessible through a nationwide data communications network funded jointly with Magnetic Fusion Energy.

The BES research program includes over 1200 projects; more than half of them are funded at the national laboratories. The remainder is carried out at universities and business and government laboratories. The research supported is selected on the bases of scientific merit, potential for increasing our technological base, and relevance to ultimately meeting the nation's diverse needs for energy. To carry out this program, BES plans, supports and administers energy related research in the physical, biological, mathematical and engineering sciences. New scientific information in these areas addresses the Administration's goals by providing the fundamental scientific and engineering base on which the Nation's future energy options depend. The strategy continues to be to:

Provide critical knowledge and data by supporting basic research in DOE mission areas;

Provide for, and support operation of, unique, specialized research facilities;

Exchange information with other DOE programs, Federal agencies, and the academic and industrial scientific communities;

Take full advantage of the scientific and industrial communities' identification of needs and opportunities for research in areas likely to be relevant to future energy options; and

Develop trained scientific talent through support of basic research at universities and national laboratories; and

Promote early applications of the results of basic research.

Implementation of this strategy requires:

Maintenance of a strong core program -- this calls for continuity of support for scientists involved in our current program activities, and the training of new, younger scientists;

Continued operation of existing, unique facilities important to research in the U.S. while at the same time providing for new facilities and for their operation; and

Creation of opportunities for exploiting new, emerging areas that are of potential importance to energy.

The program support provided to national laboratories can be divided into two major categories. A large portion is associated with support of national user facilities for which access is provided to the entire scientific community. The national laboratory serves as the host organization and selects and arranges for visitor participation, provides necessary specialized equipment and staff, administers all activities necessary to keep the facility operating, and performs necessary facility research and improvements necessary to continue its operation at the forefront of science.

The second major component of the national laboratory program is the support of research which takes advantage of the unique environment which exists at these institutions. By the very nature of the national laboratories and their traditional focus, the national laboratories are especially valuable in doing research which is applicable to a number of energy concepts. The interactions possible are very great because laboratory scientists are frequently involved in all aspects of the applied energy programs. In addition, the stability of the organization and specialized capabilities which exist at the laboratories in many instances are unmatched. As an example, the unique computer capabilities at the national laboratories are among the best in the world. The same can be said for neutron research capabilities at ORNL, ANL, and BNL. The programs supported at the laboratories are designed to exploit these unique capabilities, and programs are supported for which a long-range commitment must be made to achieve the desired results.

Many of the scientists involved in BES research programs are faculty or students at universities. Their research is enhanced through access to special facilities at national laboratories. More than one-third of BES funding supports university-based research. The list of universities receiving support covers almost every state and includes participation by both large and small institutions.

The BES program supports numerous special grants and research contracts in which costs are shared by universities. Their contributions are provided through a number of mechanisms, e.g., salaries to investigators, summer student assignments, provision of facilities and/or equipment, etc. An important benefit resulting from supporting research in universities is the research training of graduate students who continue in R&D after completion of their studies.

In addition to universities and national laboratories, BES maintains ties with industry. Representatives from different industries serve on counseling committees for several of the BES subprograms; experts from industry participate in the review of research proposals and use the specialized facilities sponsored by BES; industrial scientists participate in program advisory committees at the national laboratories; and industry representatives are invited to attend BES conferences and workshops on special topics. Through these and other mechanisms available to, and used by, the scientific community, the results of BES supported research are available to industry and to the academic community.

The U.S. has been the world leader in science and technology and has derived many economic benefits from its leadership. The Department of Energy and its multiprogram laboratories play an important role in the nation's scientific enterprise that is essential for our preeminence. A central feature of this role has been the construction and operation of large, specialized scientific facilities that are used by scientists from universities and industry as well as the national laboratories. Many of the scientific facilities in our multiprogram laboratories are old or are becoming old and their scientific productivity will soon become marginal. In order to make further progress in certain fields, new, more powerful facilities are required.

In the past few years, the Department has given special attention to correcting deficiencies at its laboratories in environment, health, safety, security, safeguards, multiprogram general purpose facilities and other such areas. However, less attention has been paid to improving the essential scientific facilities required to accomplish the main scientific mission of the laboratories, i.e. preeminence in certain key fields of research. Four facilities have been identified by the scientific community as being the most critical to the future needs of the Department's basic research programs. The four facilities, all of which will be located at the Department's multiprogram laboratories, are: 1-2 GeV Synchrotron Radiation Source - Lawrence Berkeley Laboratory; 6 GeV Synchrotron Radiation Source - Argonne National Laboratory; Advanced Steady State Research Reactor - Oak Ridge National Laboratory; and Relativistic Heavy Ion Collider - Brookhaven National Laboratory. This latter facility is budgeted in the Nuclear Physics Program. The FY 1987 request includes a start toward development of these facilities for the Nation.

	FY 1985	FY 1986	FY 1987 Request
Materials Sciences			
Operating Expenses......................	$132,227	$134,248	$156,931
Capital Equipment.......................	15,450	11,979	15,500
Construction............................	36,580	42,333	23,960
Total Materials Sciences..............	$184,257	$188,560	$196,391

The Materials Sciences subprogram has as its goal to provide the Agency and the Nation with an increased level of understanding in the science of materials, which will contribute to meeting the needs of present and future energy technologies. Knowledge or lack of knowledge in materials science and technology plays a crucial role in the development of energy systems or other high technology industries. The field of materials science is important because it pushes forward the frontiers of knowledge and trains new scientists in subjects which are highly interactive with industrial topics. Materials problems and limitations often restrict the performance of current energy systems and the development of future systems. A few examples of such problems and limitations include: degradation of mirror materials and low conversion efficiency photovoltaic materials for solar energy; degradation of materials properties due to irradiation in fission and fusion energy systems; thermal and mechanical instabilities of materials for heat engines; and corrosion and compatible materials for containing nuclear waste.

Many studies and reviews in recent years have pointed to both the importance of the field of materials science and to the opportunities and high quality of the research. Most notably these studies have been conducted by the National Academy of Sciences and the Energy Research Advisory Board. The Congress has also expressed great interest in materials research and this past year sponsored a workshop on the subject. In all of these studies and reviews, the Materials Sciences subprogram has played a key national role.

While each Federal agency conducts materials research to meet its own particular objectives, coordination across agencies is readily accomplished through established committees and interactions. In the area of basic materials research, the Materials Sciences subprogram coordinates its research most directly with the National Science Foundation's (NSF) Materials Research Division and the more basic programs of the Department of Defense. The unique aspect of the Materials Sciences subprogram is the focus on energy related research and the use of advanced diagnostic techniques made possible by state-of-the-art research facilities supported by this subprogram. These activities complement the NSF and other agency programs and are needed to carry out the mission of the DOE. As an example of how the DOE programs complement the work at other agencies, the DOE program is very significant in radiation effects, corrosion-erosion related to fossil energy systems, solar photovoltaic materials, or nuclear waste isolation materials, whereas the NSF program tends to be much more generic and tends to focus almost exclusively on small-scale science with limited involvement of major facilities. The Materials Sciences subprogram also has large efforts in facility-related research such as neutron scattering, synchrotron radiation research, and electron microscopy, compared to the relatively small efforts in the NSF program.

The Materials Sciences subprogram has traditionally provided most of the development, construction, and operational support of large facilities for the total national materials program. Use of these major facilities is open to all qualified researchers. A recent survey of these collaborative research centers under the purview of the Materials Sciences subprogram has shown that they accommodated about 1100 users. The users came from DOE laboratories (21 percent), universities (48 percent), industry (14 percent), and the remainder from other organizations. The replacement cost for these facilities is estimated at over $500,000,000. The Materials Sciences research funding at these facilities in FY 1985 was about $20,000,000 with another $14,000,000 being attracted from outside the Materials Sciences subprogram.

The FY 1987 request includes the following amounts for the Materials Sciences subprogram: $156,931,000 in operating funds which provides support for the operation of facilities and research of all types; $15,500,000 in capital equipment in support of the research objectives and $23,960,000 in construction which will permit continuation and/or completion of ongoing projects at Lawrence Berkeley Laboratory (LBL) (Center for Advanced Materials); Brookhaven National Laboratory (BNL) (National Synchrotron Light Source); and Stanford University (Stanford Synchrotron Radiation Laboratory); A-E and long lead procurement activities for the 1-2 GeV Synchrotron Radiation Source at Lawrence Berkeley Laboratory; initiation of a new construction project, the Los Alamos Neutron Scattering Experimental Hall, plus funds for Accelerator and Reactor Improvements and Modifications.

The opportunities available to the field of materials science continue to outpace the resources. New methods for characterizing materials and new materials structures are being uncovered. As a result, the time is right to exploit these opportunities and make the advances needed to solve outstanding scientific questions and technological problems. Coupling the experimental and theoretical advances with improved ability to prepare new materials will open up opportunities to design materials from fundamental principles and overcome or circumvent known and anticipated energy related materials problems.

Some of the problem areas and needs to which the Materials Science research ultimately contributes include:

- Developing new or substitute materials
- Tailoring materials to satisfy defined requirements
- Predicting materials problems and service life
- Improving the ability to successfully attack unforeseen materials problems in advanced energy systems, and
- Improving the theoretical and experimental capability to analyze the fundamental structure of materials

To uncover the new knowledge and information to meet these needs, Materials Sciences, comprised of the subfields of metallurgy, ceramics, solid state physics, and materials chemistry, places emphasis on selected generic areas of fundamental importance and on areas where problems are known to exist or are anticipated. Some research is directed at a single energy technology (e.g., photovoltaic materials for solar energy conversion), some research would have applicability to many technologies simultaneously (e.g., embrittlement of structural materials due to the presence of hydrogen), and still other research has more fundamental implications underpinning all materials research (e.g., mechanisms of atomic transport of solids). The research is conducted among a variety of institutions--national laboratories, universities, and to a lesser extent, industry.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	General Reduction	Management Initiatives	FTE General Reduction	Gramm-Rudman-Hollings	Subtotal	Comparability Adjustments	Adjusted Approp. Total
Basic Energy Sciences								
Material Sciences								
Operating Expenses	$140,496		$ -975		$ -5,273	$134,248		$134,248
Capital Equipment	12,450		--		-471	11,979		11,979
Construction	43,995		--		-1,662	42,333		42,333
Subtotal	196,941		-975		-7,406	188,560		188,560
Chemical Sciences								
Operating Expenses	81,495		-305		-3,067	78,123		78,123
Capital Equipment	8,840		--		-334	8,506		8,506
Construction	5,830		--		-221	5,609		5,609
Subtotal	96,165		-305		-3,622	92,238		92,238
Nuclear Sciences								
Operating Expenses	43,338		-265		-1,628	41,445		41,445
Capital Equipment	2,754		-200		-97	2,457		2,457
Construction	1,300		--		-49	1,251		1,251
Subtotal	47,392		-465		-1,774	45,153		45,153
Applied Mathematical Sciences								
Operating Expenses	39,520		-105		-1,490	37,925		37,925
Capital Equipment	1,070		--		-40	1,030		1,030
Construction....................	5,000		--		-189	4,811		4,811
Subtotal	45,590		-105		-1,719	43,766		43,766
Engineering and Geosciences								
Operating Expenses	26,675		-100		-1,004	25,571		25,571
Capital Equipment	1,500		--		-57	1,443		1,443
Construction....................	8,000		--		-302	7,698		7,698
Subtotal	36,175		-100		-1,363	34,712		34,712
Advanced Energy Projects								
Operating Expenses	7,602		-30		-286	7,286		7,286
Capital Equipment	320		--		-12	308		308
Subtotal	7,922		-30		-298	7,594		7,594
Biological Energy Research								
Operating Expenses	12,455		-25		-470	11,960		11,960
Capital Equipment	560		-25		-20	515		515
Construction....................	6,000		--		-227	5,773		5,773
Subtotal	19,015		-50		-717	18,248		18,248
Program Direction								
Operating Expenses	4,100	-335	--	-124	-142	3,499		3,499
Subtotal, Basic Energy Sciences	$453,300	$ -335	$ -2,030	$ -124	$-17,041	$433,770		$433,770

	FY 1986 Confer.	General Reduction	Management Initiatives	FTE General Reduction	Gramm-Rudman-Hollings	Subtotal	Comparability Adjustments	Adjusted Approp. Total
General Reduction:								
Operating Expenses	-335	335						
Capital Equipment	--	--						
Construction	--	--						
Total, General Reductions	-335	335						
Management Initiatives:								
Operating Expenses	-1,805		1,805					
Capital Equipment	-225		225					
Construction	--		--					
Total, Management Initiatives	-2,030		2,030					
Pay Restoration								
Total, Basic Energy Sciences..	$450,935	$ --	$ --	$ -124	$-17,041	$433,770		$433,770
Operating Expenses	353,541			-124	-13,360	340,057		340,057
Capital Equipment	27,269				1,031	26,238		26,238
Construction	70,125				-2,650	67,475		67,475

In addition to maintaining an appropriate mix among long-term sciences, multitechnology and single energy technology oriented research, a balance must be achieved between research at forefront large facilities and research consisting of small individual projects. Certain types of research simply cannot be carried out without large facilities (e.g., neutron sources with significant fluxes of neutrons cannot be made in "small" sizes). Also newer instruments with significant improvement in capability (e.g., synchrotron radiation sources) are very expensive to build and operate. The Materials Sciences subprogram utilizes several major user facilities in the pursuit of its research goals, including the National Synchrotron Light Source (NSLS) BNL, High Flux Isotope Reactor (HFIR) Oak Ridge National Laboratory (ORNL), Intense Pulsed Neutron Source (IPNS) Argonne National Laboratory (ANL), Neutron Scattering Experimental Hall, Los Alamos Neutron Scattering Center (LANSCE), and the Stanford Synchrotron Radiation Laboratory (SSRL). Other smaller research centers include the Low Temperature Neutron Irradiation Facility (LTNIF) ORNL, Surface Modification and Characterization Laboratory (SMCL) ORNL, Electron Microscope centers at ORNL, ANL, LBL, and the University of Illinois and the Materials Preparation Center (MPC) at Ames Laboratory. These facilities are also available to qualified users outside the home institution.

The subprogram utilizes workshops and reports of its Council on Materials Science (a non-Governmental body with representatives from academia, industry, and agency laboratories) to help focus on critical issues. Panel meetings during 1984 were held on computer simulation and materials synthesis. In 1985, panel meetings were held on microfracture and surface adhesion/bonding. The reports resulting from these workshops and panels are distributed widely, including publication in the open literature. Through the auspices of the Council, a review of user facility operations has started with the electron microscope facilities in 1985.

Reviews of the neutron sources and synchrotron radiation sources will follow. Interactions and information transfer with the agency's applied materials research takes place through a number of mechanisms including a formalized Research Assistance Task Force. Examples of these latter activities include meetings on fast ion conductors and corrosion in fossil energy systems. Through these latter meetings the basic researchers learn of the problems in the applied programs and the researchers in technology oriented programs are exposed to scientists with a fundamental understanding of matter. Coordination among the Department's materials programs takes place primarily through the Energy Materials Coordinating Committee. Within the Federal Government, the subprogram is coordinated in part through the interagency Committee on Materials (COMAT) and the basic Interagency Materials Group. At the Federal program level, Materials Sciences continues to represent about one-third of the Federal government support for basic materials research.

Both directly and indirectly this subprogram supports the development of a national position on materials research. The ability to provide such support stems directly from the experience and continuity within the Materials Sciences subprogram. The fundamental understanding of materials obtained in this subprogram has led to new approaches to alloy design for critical materials substitution, new materials with superior properties and advanced characterization techniques. Materials Sciences is recognized throughout the research community for its excellence. Past technical accomplishments have moved into the technological or commercial sector (e.g., radiation resistant alloys, glassy metals, ion implantation techniques for surface modification, and superconducting wire), and it is expected that through the proven method of technology/information transfer and effective management this year's accomplishments will likewise find use either for building our fundamental base of materials understanding or in some technological application in the future. Industrial interactions with this subprogram are encouraged and indeed have been successful. The large number of patents issued under this subprogram is further evidence of the strong and appropriate technological orientation. Significant progress was made during the past year in many areas of the subprogram. Some examples of recent accomplishments include:

- For the first time, magnetic ordering (arrangement of the magnetic moments of individual items in materials) has been measured using X-rays. Magnetic ordering of the rare earth metal holmium has been measured using X-rays at the world's most intense X-ray beam line at SSRL. The magnetic scattering peak position shows an oscillation that is temperature dependent indicating an oscillation in the spiral magnetic ordering. This is the first conclusive magnetic X-ray scattering measurement made and reveals additional new capabilities for intense synchrotron radiation sources.

- The highest superconducting transition temperature (5K) has been found for an organic compound at ambient pressure. This development opens the possibility of radically new conducting organic materials which could revolutionize electrical systems.

- An automated synthesis technique has been developed that enables the preparation of low cost magnetostrictive alloys (changes in the dimensions of materials due to applied magnetic fields). The technique yields grain oriented rare earth-iron magnetostrictive (Tb-Dy-Fe) material with circular, square and hexagonal cross sections useful for transducer components and single crystals with selected axial crystallographic orientation. With this new technique, the cost of such components may be reduced by 50-75 percent. These materials will enable significant improvements to be made in the performance of transducers in jet and diesel engine fuel injection systems, submarine detection devices, and position detecting transducers in robotic systems as a consequence of the increased magnetostriction obtained in this alloy produced by this new synthesis technique.

- For the first time, a detailed characterization of cavity evolution during the compressive creep deformation of ceramic materials has been determined. Using neutron scattering measurements, it has been shown that cavity nucleation does occur, usually throughout the service lifetime prior to fracture, and that the cavity growth is transient and quickly reaches a size of about 100 nanometers. These statistical data can not be obtained by any other method and are needed in order to improve the performance and predict the service lifetimes of structural ceramic components envisaged in the next generation of energy conserving heat engines.

Within the FY 1987 request current emphases and trends in the subprogram will be continued and extended with no significant change. Because of the opportunities and increased demand to utilize major user facilities, the operations together with research at these facilities will increase. At the FY 1987 request, research will be strengthened in selected technical areas at the expense of other ongoing projects. The university portion of the program not located at DOE laboratories will be maintained at about 20 percent. When including Ames Laboratory (Iowa State University) and Lawrence Berkeley Laboratory (University of California), which are similar to other academic programs, the support going to universities is scheduled to be about 36 percent. Areas identified for emphasis generally fall into two categories of objectives: 1) synthesis, alloying, and preparation of new materials and structures; or 2) materials characterization and property measurements using highly advanced techniques. In consonance with the subprogram's long range plans published last year, the relative emphasis will be on category 1) areas where possible, recognizing of course that the two categories need to be coupled. Research areas to be emphasized include:

processing and mechanical behavior of structural ceramics; structure and properties of polymers; unique calculations, properties and measurements on surfaces, interfaces, and modified surfaces; high flux pulsed neutron scattering research; X-ray lithography, topography, and surface structural measurements using synchrotron radiation; use of high speed computers to calculate and simulate materials phenomena; and electron microscopy and property measurements on advanced materials such as high temperature, ordered, intermetallic compounds, nonequilibrium materials and atomically layered structures. As mentioned above, the limited resources available requires that most of the new emphases be undertaken at the expense of lower priority but still productive activities.

The FY 1987 request for the Materials Sciences subprogram will provide for needed continuity and permit a reasonable level of utilization of major facilities, and strengthening of important topical areas recommended by workshops, panels of the Council on Materials Science and National Academy of Sciences reports. The operating funds of $156,931,000 include part of the needed $10,000,000 for optimum facility operations. This includes added requirements at HFBR for safeguards and security, the first full year of operation of the Los Alamos Neutron Scattering Center (LANSCE) and the full operation of NSLS now that the X-ray ring is operational. Selective decreases will be made to the operating schedule of some small facilities. At the FY 1987 request all user facilities will continue to operate. About one third of the operating increase allowed will be earmarked for research and one third for facility operations and one third for research and development of advanced facilities. Selective decreases will also take place in the research programs to accommodate some specific strengthening and cost-of-living increases. This level for the capital equipment portion of the budget will be used to replace outmoded equipment and allow for some new avenues of research, new spectrometers at neutron sources and new beam lines at synchrotron radiation facilities. This capital equipment level will permit the subprogram to adequately equip the research programs moving into vitally important new areas such as semiconductor materials preparation, ceramics processing and the exploration of new high-strength or high-conductivity polymers. Funds in the amount of $300,000 are included for partial support of Atmospheric Release Advisory Capability operations managed by the Assistant Secretary for Environment, Safety, and Health.

The FY 1987 request for Materials Sciences for construction will permit completion or continuation of FY 1986 approved projects and a start on two new projects. At the Stanford Synchrotron Radiation Laboratory (SSRL), funds of $1,717,000 are requested in FY 1987 to complete the SSRL enhancement project consisting of improvements and a small laboratory addition to SSRL totaling $12,930,000. At Brookhaven National Laboratory, funds of $2,600,000 in FY 1987 are requested to complete the National Synchrotron Light Source (NSLS) beam lines and building expansion project totaling $19,700,000. At Lawrence Berkeley Laboratory, funds are requested in FY 1987 for continuation of the project, Center for Advanced Materials, consisting of two buildings--a Surface Science and Catalysis Laboratory and an Advanced Materials Laboratory. This request is for $10,560,000 of a total project cost of $40,250,000. At Los Alamos, FY 1987 funds of $5,000,000 are requested to initiate construction of the Neutron Scattering Experimental Hall, which has a TEC of $17,500,000. Accelerator and Reactor Improvements and Modifications (ARIM) funds of $2,583,000 are also requested for the existing facilities at BNL (HFBR and the NSLS) and the Ames Laboratory. Further details for each of the construction projects are provided in the attached construction data sheets.

Included in the program described above are funds for new scientific facilities research and development to better define technical parameters and define project costs. The United States has been the world leader in science and technology with the Department of Energy playing a crucial role through the innovation, development, construction, and operation of accelerator-based or reactor-based specialized scientific/engineering facilities. These unique facilities are used by scientists from universities and industry as well as the national laboratories.

The Department proposes to begin the process of providing the technical community with new more powerful facilities to advance the state of technology and the competitive position of the United States in these areas. Two of the highest priority BES-related facilities proposed are: 1-2 GeV Synchrotron Radiation Source (LBL), and continued research and development on the 6 GeV Synchrotron Radiation Source (ANL). The concept and need for these facilities have been reviewed and recommended by several committees, most notably and recently the National Research Council (NRC) study of Major Materials Facilities and the DOE Energy Research Advisory Board review of the NRC report. Since significant research has been conducted in the past, the 1-2 GeV facility is being proposed for construction by requesting architect-engineer and long-lead procurement work in FY 1987. Research and development for the 6 GeV facility will be continued to prepare for a future decision regarding construction at ANL.

The 1-2 GeV Synchrotron Radiation Source (LBL, TEC - $90-100M) consists of a storage ring with many straight sections for magnetic devices which produce high intensity vacuum ultraviolet radiation. The complement of magnetic devices will provide 30 or more experimental stations with radiation of high brilliance and very low emittance. The injection and accelerating system for the storage ring provides the circulating particles with energies in the 1-2 GeV range.

This facility will provide intense photon beams with the ability to undertake very short-lived timing experiments. This facility, which would have the highest brightness and lowest emittance in the world in this energy range, would be used primarily for surface investigations and spectroscopy important to physics, materials, chemistry, biology and several commercially significant technologies. The picosecond timing also makes it possible to study processes and materials that occur over periods as short as 10^{-11} seconds. The beam brilliance would allow entirely new studies of dense plasmas and absorption by highly-ionized atomic species. Microlithography techniques would be explored for the efficient production of electronic devices and soft X-ray microscopy and holographic techniques would be developed with high spatial resolution for the diagnosis of biological specimens. Other experiments important to national security needs would also be undertaken. Funding for A-E and long-lead procurement is requested ($1,500,000 construction) in FY 1987 in order to refine the costs, schedule and design in preparation for construction. FY 1987 funding ($1,500,000 operating and $500,000 capital equipment) for research and development activities related to a final storage ring lattice design would also include investigations of RF, beam instrumentation and control and new vacuum systems that are needed for peak performance characteristics. The intense photon beams which would be employed would require radiation-hardening studies of several components of the beamline complex.

The 6 GeV Synchrotron Radiation Source (ANL) as currently envisaged would consist of a large storage ring containing as many as 30 magnetic devices to give intense hard X-rays. The injection and booster systems would be designed to inject positrons into the storage ring at the design energy of 6 GeV. Beam currents as high as 100 milliamperes and lifetimes of at least 10 hours are anticipated. Most importantly, the lowest possible beam emittance would be sought to give the highest brilliance X-ray source strength by a factor of 10,000 over any in existence. This facility would impact heavily on the fields of physics, materials, chemistry, biology and medicine, and many technologies. Determination of bulk and surface structure will be performed with greater resolution and accuracy. Observation of catalytic activity in Materials with less than 1/10 of an atomic layer will be possible. Microprobe characterization will allow impurity detection in the parts per billion range, and inelastic X-ray scattering, an unexplored field, will be possible. Investigating time-dependent phenomena in biological membranes and in photocyclic processes will be possible as will observing the motion of atoms in proteins. Angiography of coronary and tumor diseases will be advanced through non-invasive and very fast X-ray diagnostics without the use of dyes or drugs. Topography, the study of surface imperfections, will be extended to time-resolved studies of plastic deformation and fracture. All of these investigations are made possible by the photon energy, time-structure, intensity, and unusual brilliance of the radiation source. Other experiments important to national security needs would also be undertaken.

FY 1987 ($2,000,000 operating and $1,000,000 capital equipment) research and development funding will be used to refine the lattice design of the storage ring, design and test new radio frequency cavity systems, advance vacuum technology and surface cleaning techniques, and investigate beamline components that must withstand greater X-ray intensities than have been previously achieved.

	FY 1985	FY 1986	FY 1987 Request
Chemical Sciences			
Operating Expenses......................	$ 78,592	$ 78,123	$ 86,419
Capital Equipment.......................	8,840	8,506	9,555
Construction............................	5,550	5,609	5,430
Total Chemical Sciences...............	$ 92,982	$ 92,238	$101,404

The purpose of the Chemical Sciences subprogram is to expand the knowledge base of chemistry and atomic physics on which future energy technologies depend. In the foreseeable mix of energy systems, most of the technologies will depend on processes which are chemical, or based on atomic physics. Our future energy supply depends on present strong support of research seeking knowledge in fields which are basic to energy processes.

Recently a panel of the National Academy of Sciences/National Research Council, as well as the American Chemical Society, senior academic scientists, and senior industry scientists have advocated increased funding for chemical research. They have pointed to the importance of chemistry in our energy economy and to the potential losses from the current limited level of research. The Energy Research Advisory Board, in its recent appraisal of the DOE Technology Base, placed Chemical Sciences in the top grouping of subprograms recommended for increased funding.

The Chemical Sciences subprogram spans a broad front, but emphasizes eight areas because of their importance to energy technologies. The areas are: photoconversion (light energy to fuel energy or electricity), chemical physics (including basic chemistry of combustion), atomic physics (a subfield important to magnetic fusion), basics of coal chemistry, heterogeneous and homogeneous catalysis (especially that underlying coal conversion and more efficient processing of petrochemicals), separations and analytical science (underlying virtually every facet of process chemistry) and chemical thermodynamics (the chemical basis for predicting the optimal handling of hydrocarbon mixtures).

Photochemists are moving closer to a full understanding of photosynthesis, an understanding necessary if we are to imitate and improve on nature's efficiency in forming fuels from airborne gases. They are also building the knowledge base which may enable us to produce hydrogen from water at a reasonable cost.

In-depth understanding of combustion is important to the use of lower grade fuels and to continued progress in improvement of the efficiency of engines, especially automotive engines.

Researchers in atomic physics are making steady progress in enlarging our knowledge of the behavior of the highly stripped ions which can seriously lower the efficiency of fusion reactions, thereby providing guidance as to choice of materials. The behavior of ions at energies higher than fusion energies is also being examined.

Scientists supported by Chemical Sciences are studying the molecular structures of coals and the chemical reactivities of the coal constituents in order to give coal technologists better bases for improving existing coal processes and for developing new and better concepts for obtaining synfuels from coal. Premium quality samples of coals, standardized and preserved, are being provided to the research community for comparability of research done at different times and places.

Just as catalysis is used today in production of billions of dollars' worth of fuels, plastics, etc., it is reasonable to expect that, given in-depth understanding, catalysts can be designed for production of tomorrow's fuels. Those Chemical Sciences researchers engaged in catalysis research are making steady progress toward that goal of full understanding.

Many separation processes often require special extractants to remove selected constituents from process or waste streams. Such separations require both theoretical and experimental understanding to design and synthesize these extractants. Some separation processes, such as distillation of petroleum or synfuel fractions, consume large amounts of energy. New knowledge and insights can help improve existing processes, and can help create entirely new concepts which are less energy intensive. Conceptual neighbors of separations chemists are the analytical chemists who are generating basic, widely applicable approaches to analysis. It is important, in many processes which make fuels or consume energy for other purposes, to identify and quantify impurities which can spoil a product, poison a catalyst or prevent the desired chemical processes.

Chemical thermodynamic studies are being pursued in order to strengthen the knowledge needed to design major plants for producing or handling hydrocarbon fuels. Many fuel mixtures currently or potentially important are not covered by currently available data. Measuring every mixture of interest would be too costly, so thermodynamical research on a sound theoretical basis is providing the needed calculational predictive capabilities.

Two major user facilities receive support through Chemical Sciences. Both facilities were constructed by Basic Energy Sciences for use of scientists in DOE programs and qualified visiting researchers. The Combustion Research Facility (CRF) at the Sandia National Laboratories (Livermore) receives its entire facility operating support from Chemical Sciences, which also provides a major part of the user research support. The National Synchrotron Light Source (NSLS) at Brookhaven National Laboratory receives facility operating and research support from both Chemical Sciences and Materials Sciences.

The operation of the CRF facility includes continued improvement of its unique state-of-the-art laser systems and providing laboratory space, equipment and advisory assistance to visiting users. The automobile industry is prominent among the users; its leaders have stated that CRF is the first Federal research laboratory to attract that industry. CRF research involves inventing, developing and using advanced diagnostic techniques to provide such key information as identities and quantities of very short-lived flame constituents, profiles of temperatures in flames and modeling of turbulence. These are important kinds of information needed for improvements to combustion systems.

Details on the operation of the NSLS are set forth in the Materials Sciences part of this document. The areas of research supported at NSLS by Chemical Sciences are chosen for their combination of scientific insights and importance to chemical and atomic physics problems in energy technologies. Among them: photochemistry in the ultraviolet, electronic interactions between surfaces and adsorbed molecules, and photon excitation and ionization of atoms and molecules.

The Chemical Sciences effort is coordinated with other DOE programs involving chemistry and with other Federal agencies. Periodic meetings of the Federal Interagency Chemistry Representatives and exchanges of lists of proposals and funding actions supplement frequent individual contacts between staffs. Annual and biennial topical conferences bring together the researchers in specific areas of the subprogram with industrial scientists and others.

Typical advances in energy-related chemistry and atomic physics achieved this year by Chemical Sciences are:

- Styrene-based polymers with active phosphorus-containing groups have been discovered which efficiently and economically recover major or trace amounts of toxic or precious metals, e.g., mercury or gold, from waste streams, rivers or sea water. The new extractants are synthesized from inexpensive chemicals. They contrast with present systems which generally require more expensive materials or multiple separation steps to accomplish the same degree of recovery. They were devised through a collaborative university-national laboratory effort.

- A significant advance in the quest for an artificial photosynthetic system has been achieved by chemical synthesis of a model photoreaction center. A key feature of this system is that charge separation occurs following photoinitiated multiple electron transfers. This moves us closer to the goal of improving on natural photosynthesis by positioning of electron donor and acceptor components in the optimum geometry for high efficiency solar conversion.

- Recent results will make possible a new and detailed understanding of the effects of poisons and promoters in catalytic systems. Superior accuracy and resolution of infrared spectral bands, achieved by combining different state-of-the-art techniques for adsorbed species on single crystals in a multipurpose ultrahigh vacuum system, revealed that the frequency shifts caused by changing the amount of carbon monoxide adsorbed on a Ni(111) crystal surface are due to modification of the chemical properties of the nickel surface itself, caused by the adsorbed carbon monoxide.

- A study on the separation of coal at ANL has resulted in the development and implementation of a method for providing very pure coal components that is now being used in several other coal research laboratories. Further, the Premium Coal Sample Program at ANL has successfully processed and sealed samples of the first premium coal, to be available to scientists world wide for comparability of basic research results obtained at different times and places for many years. The availability of premium coal samples and pure coal macerals in quantity is fostering meaningful collaborative studies between ANL and both university and industrial laboratories.

- Laser-induced chemistry has found a new kind of molecular behavior. The absorption of light by a molecule, to introduce either large or small amounts of vibrational energy among its atoms, shows regular frequency spacings which fit quantum mechanical predictions. However, there is an intermediate, heretofore inaccessible energy region where increased vibrational energy does not follow this pattern, but may be randomly distributed. This random behavior has been observed for the first time in acetylene. One laser was used to excite the acetylene molecules to high vibrational states and a different laser then triggered energy emission to get down to the intermediate region.

The FY 1987 request for operating funds is $86,419,000. Within this, an increment will provide for operating costs of the two major user facilities (CRF wholly, NSLS partly), including assistance to visiting users, and research using their capabilities for the areas of chemistry described above.

Also included in the FY 1987 request is an increment to permit restoration in areas which have been identified as important to the knowledge base for energy technologies and which offer a high degree of scientific opportunity. One of these is chemical reactivity; this area includes study of chemical dynamics in the gas phase, which is basic to many energy systems, especially improved combustion technology. An important scientific tool, pulse radiolysis, will be brought to bear as a generator of the short-lived but important species which figure in combustion. Combined with it will be use of laser techniques such as coherent Raman spectroscopy and multiphoton ionization to characterize the species. Experts in chemical theory will provide direct and meaningful interaction with experimentalists, extending previous calculations of molecular and radical reactivities in species extending from these containing only two or three atoms to up to ten. Also studied will be reactive intermediates in condensed phases, since many chemical processes which form or convert fuels involve complex mixtures of substances undergoing chemical reactions, both desired and undesired, dispersed in solvents.

To understand the chemistry of such mixtures, effort will be directed toward understanding the individual reactions, their effects on each other and the effects of the solvent molecules. Prominent here will be study of the influence of solvent dielectrics on chemical kinetics and the relation of electronic structure to reactivity. Another aspect of the area of chemical reactivity will concern electron transfer in chemical systems. This will contribute especially to improved understanding of photosynthesis which could lead to a variety of new uses of sunlight to form fuels. Related to this will be study of the effects of the colloidal state on photoexcited electron transfer, an area likely to lead to qualitatively new knowledge.

Another area of emphasis is related to chemical catalysis. This area of the knowledge base is pervasive in energy technologies, and is at a stage likely to see scientific breakthroughs. Studies will be conducted to exploit a new and scientifically powerful technique recently pioneered in Chemical Sciences: laser-induced generation of small clusters of metal atoms of selectable size and of controllable combination with desired numbers of nonmetal atoms. The insights to be gained with this technique may lead to better understanding of various kinds of catalytic chemistry, including fuel conversions, as well as other energy-related chemical processes.

At Kansas State University the new Ion Collision Physics Facility will be nearing completion and the research activities will include stepped up preparation for its use. The cryogenic electron beam ion source (CRYEBIS), when operational, will not only strongly advance the efficiency and capabilities of scientific research on the behavior of multiply charged ions but will also greatly improve our ability to unravel the complexities of behavior of highly stripped, relatively slow moving metal ions, which must be understood in the design of magnetic fusion devices.

The remainder of the increase will allow for requirements which include the effects of inflation on research capability, and interagency activities such as panels of the National Research Council. The balance of the Chemical Sciences subprogram will continue the activities described earlier, with the evolving of scientific thrusts which has long characterized the subprogram.

The request for capital equipment funds is $9,555,000. The request includes General Purpose Equipment for ANL ($2,200,000) and the Ames Laboratory ($155,000). The principal other purpose for these capital equipment funds is to provide the advanced instruments which are revolutionizing chemical research. The measurements they allow promise to open knowledge even more meaningful than heretofore possible in areas important to energy technologies. Typical of these instruments are ultra-high field nuclear magnetic resonance spectrometers, advanced lasers, multiparameter molecular and ion beam machines, and Fourier Transform electron spin resonance spectrometers.

The request for construction funds is $5,430,000. The largest part of the need results from landlord responsibilities for sites for which BES has overall landlord responsibility: $3,000,000 for ANL, $600,000 for the Ames Laboratory, $300,000 for the Combustion Research Facility and $30,000 for the Notre Dame Radiation Laboratory. As shown above, the largest component of the request is for ANL, where there remains a heavy backlog of needs affecting plant efficiency following several years of extremely severe budget stringency. Details are shown in the attached construction data sheet (87-R-400).

Also included in the request is $1,200,000 to complete construction of the Ion Collision Physics Facility at Kansas State University. Initiated in FY 1985, this project has a total estimated cost of $5,100,000. It represents the United States' first atomic physics facility which is based on state-of-the-art ion accelerators and it will restore US competitiveness in the area of ion collision physics, an area of importance in science and energy. Details are described in the construction project data sheet 85-ER-403. The final part of the construction request is Accelerator Improvement and Modification funding of $300,000 which is needed in order to install two beam lines for atomic physics research at the Holifield Heavy Ion Research Facility, thus greatly enhancing the capability to perform research on highly charged ions.

	FY 1985	FY 1986	FY 1987 Request
Nuclear Sciences			
Operating Expenses......................	$ 39,641	$ 41,445	$ 46,913
Capital Equipment.......................	2,950	2,457	2,930
Construction............................	300	1,251	150
Total Nuclear Sciences................	$ 42,891	$ 45,153	$ 49,993

The Nuclear Sciences subprogram encompasses five principal activities: (1) advancing the knowledge and understanding of the heavy elements' chemical and physical behavior; (2) providing isotopically enriched samples of ordinary elements and samples of the man made transplutonium elements for research, medical, and industrial uses; (3) measuring, compiling, and evaluating nuclear data for both fission and fusion energy technologies; (4) operating the Stanford Synchrotron Radiation Laboratory for the broad community of synchrotron radiation researchers; and (5) conducting research on heavy ion accelerator technology and preparing for its evaluation as a driver for use in inertial confinement fusion systems.

The FY 1987 request for FY 1987 includes $46,913,000 for operating expenses, $2,930,000 for capital equipment, and $150,000 for construction.

Heavy Element Chemistry

Knowledge of the chemical, physical and nuclear properties of the manmade elements beyond plutonium is important to the management of nuclear materials, particularly in their chemical processing, and for medical, industrial or research applications. Also of importance is the information the heavy elements can provide to elucidate scientific theory on the chemical and physical properties of the natural elements. This research enhances that theoretical understanding because of the actinide elements' position near the limit of the periodic table. They are at the edge of the region where relativistic electrons may exist due to the exceedingly high electrical charges on their nuclei. The potential relevance of this phenomenon to their chemistry is completely unexplored.

Most heavy element research is conducted at DOE laboratories where adequate facilities exist to meet the requirements of health and safety in handling them. Some of the research is done through university research contracts or grants, often making use of DOE laboratory facilities and in collaboration with DOE laboratory scientists. Heavy Element Chemistry is a small but active field important as a source of expertise and trained people for future nuclear technologies in energy, medicine, the military and industry. The field's accomplishments are typified by these recent examples:

- Neptunium, a radioactive element in spent nuclear fuels, has long been considered a problem in underground storage because the chemical state preferred by neptunium when in ordinary ground water is mobile. Now it has been found that in some ground waters a different state of neptunium forms. That state much more readily binds chemically to soil constituents, immobilizing the neptunium.

- Results with unexpectedly wide impact have come from ultrahigh pressure studies of the crystal structures of transplutonium metals. Large collapses of volumes have shed new light on how certain electron states possessed only by the actinide elements bond their atoms together and bring about their physical, chemical and electronic properties. Changes will now be required in the theory of structure and bonding of many other chemical elements as well.

The FY 1987 request is $5,066,000 in operating funds. DOE provides essentially all the U.S. support for this field of science. The FY 1987 request for capital equipment is $361,000.

Isotope Preparations

U.S. capabilities for providing enriched isotopes in the quantities needed for clinical medicine, for biomedical and physical research and for industrial applications depend on three facilities at the Oak Ridge National Laboratory. These are the Electromagnetic Isotope Enrichment Facility (Calutrons), the High Flux Isotope Reactor (HFIR) and the Transuranium Processing Plant (TRU).

The Calutrons separate the various isotopes making up the naturally occurring elements. Samples are sold to researchers in biomedical, nuclear and other areas and to industrial suppliers of medical radioisotopes made by nuclear irradiation of the natural isotopes. In addition, a Research Materials Collection is maintained for use by nuclear physicists and other scientists, with the proviso that the samples are to be returned undamaged.

The HFIR has two purposes: producing research quantities of elements heavier than plutonium, and providing an exceptionally high flux of neutrons for studies of materials; it is one of the two principal U.S. facilities providing neutrons in continuous flux for such research. The research at HFIR is supported by the Materials Sciences subprogram of BES, the Magnetic Fusion Energy program, and the National Science Foundation.

The TRU chemically separates the desired higher elements produced in HFIR into pure form and returns the remaining target material for re-use. HFIR and TRU together are the only Western world source of californium-252, a widely used portable source of neutrons for medical, defense, industrial and scientific applications.

The FY 1987 request for Isotope Preparations is $18,077,000 in operating funds. The requested level is needed to maintain a minimal one segment operation of the calutrons. The rest of the increase is needed for the operation of the HFIR and the TRU for two purposes: maintenancd costs of cells and apparatus which have experienced exceptionally high levels of radiation and limited replacement staff who must be trained to learn operational and safety skills before retirement of staff experienced in this unique facility.

The capital equipment request for Isotope Preparations is $524,000.

Nuclear Data

The goal of the Nuclear Data activity is to establish and maintain an accurate, complete, and accessible nuclear data base to meet the long-term needs of the fission and fusion energy technologies, to support biomedical activities using radioactive materials, and to support nuclear waste management and weapons development activities of the Department. The request for FY 1987 is $11,117,000, which includes $10,442,000 for operating expenses and $675,000 for capital equipment.

The Nuclear Data activity includes the core functions of the National Nuclear Data Center (NNDC) at Brookhaven National Laboratory--compilation and encoding of neutron reaction data, coordination of the work of the Cross Section Evaluation Working Group, and maintenance of the Evaluated Nuclear Data File (ENDF). In FY 1987, priority will be given to efforts necessary for development of the next version of the Evaluated Nuclear Data File--Version VI (ENDF-VI). Work will include format modifications that will permit the inclusion of double differential cross-section data required for fusion reactor blanket and shielding design calculations and the reevaluation of nuclear data files for which new measurements have provided data of significantly improved quality. ENDF-VI will make use of new analysis methods that have been developed for the treatment of correlations among measured values of nuclear parameters. The second major data base activity is the continuous updating of the Evaluated Nuclear Structure and Decay File (ENSDF), from which the widely used Nuclear Data Sheets are produced. This effort includes significant contributions from international collaborators; the NNDC is responsible for overall coordination and review of ENSDF activities. The FY 1987 request budgets $2,375,000 in operating expenses and $75,000 in capital equipment for Brookhaven National Laboratory for support of NNDC activities.

The largest effort within the Nuclear Data activity is assigned to the performance of precision nuclear measurements vital to the improvement of the data base. The major United States facilities for carrying out nuclear data measurements are the Oak Ridge Electron Linear Accelerator (ORELA), the Argonne Fast Neutron Generator (FNG), and accelerators at the National Bureau of Standards. A major improvement in the short-pulse capability of ORELA, which established this machine as the premier facility for measuring neutron cross-sections by the powerful time-of-flight method, has recently been achieved. This increased capability will help greatly a new program to improve knowledge of experimental energy resolution functions to better characterize cross-sections in the region of resonance reactions. To make possible accurate measurement of neutron capture cross sections of the fissile and fertile isotopes, a large angle photon-multiplicity detector will be constructed at ORELA in FY 1986 and in FY 1987, when initial experiments are planned. With this detector, scientists will be able to distinguish with relatively high certainty between neutron capture and neutron-induced fission events. Total cost for this detector project is estimated at $480,000 in capital equipment funds--$270,000 in FY 1986 and $210,000 in FY 1987. The FY 1987 request includes $3,425,000 in operating expenses and $445,000 in capital equipment for ORELA's research and operations, including completion of the photon-multiplicity detector and participation in Cross Section Evaluation Working Group activities.

At the Argonne FNG, emphasis will be placed on cross-section measurements at higher neutron energies, up to 20 MeV, for materials of importance to the fusion energy program, including measurements of activation reactions that have been identified as high priority needs. Capital equipment funds will be provided in FY 1987 to ensure that state-of-the-art measurements can continue to be made at the FNG. The FY 1987 request includes $890,000 in operating expenses and $100,000 in capital equipment for FNG's research and operation, including participation in Cross Section Evaluation Working Group activities.

At the National Bureau of Standards, a continued effort will be applied to the measurement of neutron standard cross-sections including the fission cross-sections for U-235. In this precision effort, the development of new detectors has also been found necessary. In FY 1987, $645,000 in operating expenses is planned for work at the National Bureau of Standards. Other work planned for FY 1987 includes nuclear data measurement, compilation, and evaluation efforts at Los Alamos National Laboratory, Idaho National Engineering Laboratory, Lawrence Livermore National Laboratory, Lawrence Berkeley Laboratory, and eleven universities.

Stanford Synchrotron Radiation Laboratory

SSRL is one of the major synchrotron radiation facilities in the U.S. The BES and High Energy Physics (HEP) programs share use of the Stanford Positron-Electron Asymmetric Ring (SPEAR); SSRL, which is funded by the BES program, reimburses the Stanford Linear Accelerator Center (SLAC), which is funded by the HEP program, for SPEAR operating costs for those periods when SPEAR is operated in a mode optimized for synchrotron radiation research, approximately five months a year. Operating costs of SSRL are provided by the Nuclear Sciences subprogram, while the scientists who use SSRL's capabilities receive their research support from other sources, including the NSF. Qualified users from university, industry and government laboratories compete via proposal review for time on SSRL and the best are chosen for assignment of time without cost.

The active areas of research conducted at this facility are many, including materials, biology, physics, medicine and chemistry. Structures, surfaces, very thin layers, and interfaces between metals and semiconductors are among the materials thrusts. Microscopic structures of delicate proteins and living cells are among the innovative biological areas. The span of other areas is typified by: fragmentation of molecules by high energy photons, microminiaturization of integrated circuits and noninvasive angiography. The noninvasive angiography is especially interesting in that it should reduce the number of lives currently lost in the course of invasive angiography manipulations.

The request for operating expenses of SSRL is $8,068,000, an increase of $1,005,000 above FY 1986. There are three needs which will be only partially met by this request: (1) Charges by SLAC for operation of SPEAR were sharply increased in FY 1985, which has caused severe curtailments in SSRL's operation. Indications are that the SPEAR charges will be further increased. (2) Costs of electric power to SSRL will go up further due to a rate increase and the need for extra power from a higher priced supplier when the Stanford Linear Collider begins operation. (3) Costs are increasing for assistance to users, administrative costs, and undulators, multiundulator, wigglers and added experimental stations.

The request for capital equipment is $725,000. These funds are required for the many kinds of optical, electronic, vacuum, magnetic, computer and temperature control equipment used to maintain and improve capabilities at SSRL's nearly two dozen beam lines and experimental stations. Much of the existing equipment has become outdated and some of the beam line mirrors and other optical components have experienced measurable deterioration after 5 to 10 years of use.

Construction funds of $150,000 for general plant projects are requested for the electrical system. The electrical cabling of SSRL has become seriously overloaded with the many added beam lines and experimental stations of the past decade.

Heavy Ion Fusion Accelerator Research (HIFAR)

Heavy ion fusion, using intense beams of heavy ions from high energy accelerators, refers to one of the three major methods of inertial fusion, the others being laser fusion and light ion fusion, which use different technologies. From 1976 to 1983 a low-level program, including four national workshops, was conducted and the concept of heavy ion fusion was endorsed by several major reviews. A multi-year, two-phase program was formulated in 1983 and begun in FY 1984 to develop and evaluate the required heavy ion technology for future decision making. Phase I emphasizes construction of a multiple-beam experiment (MBE) at the Lawrence Berkeley Laboratory (LBL) to demonstrate the induction accelerator method. Accelerator innovations include beam current amplification and operation at the space charge limits in addition to the use of multiple beams. To be completed early in FY 1987, the MBE-4 is a 4-beam experimental test designed as a scaled-down model of the accelerator portion of a larger 16-beam accelerator called the High Temperature Experiment (HTE). Construction and operation of the HTE will constitute Phase II of the program and allow experimental evaluation of heavy ion drivers for inertial fusion.

The request for FY 1987 is for $5,905,000, including $5,260,000 operating expenses and $645,000 capital equipment. These funds support operation of MBE-4 at LBL, development of a 16-beam injector at the Los Alamos National Laboratory, and research on certain critical components for the 16-beam HTE. However, funds are not included for development of 16-beam prototype accelerator modules.

Recent accomplishments in the HIFAR program include: development of preliminary conceptual designs for the HTE based on the use of medium-mass ions such as sodium; confirmation of the feasibility of much higher beam currents than previously thought possible; completion of the MBE-4 engineering design; and successful operation of the MBE-4 cesium ion source.

	FY 1985	FY 1986	FY 1987 Request
Applied Mathematical Sciences			
Operating Expenses......................	$ 34,467	$ 37,925	$ 32,785
Capital Equipment.......................	1,500	1,030	1,100
Construction............................	0	4,811	0
Total Applied Mathematical Sciences...	$ 35,967	$ 43,766	$ 33,885

The Applied Mathematical Sciences subprogram will meet the immediate needs for scientific supercomputing in the research programs supported by the Department's Office of Energy Research and the long range needs of the Department in computational research. The program consists of two parts: Energy Science Advanced Computation and Applied Mathematical Sciences Supercomputing Research. The Energy Sciences Advanced Computation subprogram provides network access to supercomputers for Office of Energy Research contractors and grantees in universities, industry, and DOE national laboratories. The Supercomputing Research subprogram supports research in mathematical and computer science that is vital to understanding the newly emerging parallel processor supercomputer systems and the long range development of future supercomputer systems.

In recent years, the modern supercomputer has changed the nature of scientific research and technology development. The advancement of science used to depend upon experiments for data and theory for understanding. Today there is a third equally important ingredient to scientific research: computational science. Computational science serves a role that is a hybrid between theory and experiment. In some cases, computations provide insights into experimental data, and in others, computations are used to simulate the ideal experiment to test an analytical model. The emergence of computational science as an important element in scientific research and technology development is the result of the development of our ability to do computational modeling of complex physical problems and the enormous power of the modern supercomputer. This combination allows scientists and engineers to model complex problems in a much more realistic way and to obtain much more accurate answers than was possible just 5 years ago.

Scientific supercomputing now makes substantial contributions to many fields of research such as fluid dynamics, plasma dynamics, astrophysics, materials science, chemistry, atomic physics, etc. Similarly, large scale calculations are making significant contributions to product development in areas such as nuclear weapons, electronics, automobiles, aircraft, and chemicals. In product development, computer modeling is used to reduce the number of design/test iterations that are so time consuming and expensive.

The Department of Energy (DOE) has made a significant commitment to scientific supercomputing in several of its research and development programs. As an agency, DOE is the largest user of supercomputers in the world. In 1986 DOE laboratories will house 26 supercomputers. DOE's commitment to scientific computing is not new. Historically, the Department and its predecessor agencies (the Atomic Energy Commission and the Energy Research and Development Administration) caused many supercomputers to be developed through its nuclear weapons design work at the Lawrence Livermore National Laboratory and the Los Alamos National Laboratory.

The supercomputers that were developed in response to DOE needs were delivered to the DOE laboratories nearly devoid of software, requiring our laboratories to develop the necessary software for a complete supercomputer system. Through the software development efforts and the continual interaction between DOE laboratories and the supercomputer vendors, DOE has made significant contributions to supercomputer technologies.

Although DOE's defense efforts still represent the largest use of supercomputers, other DOE programs have become significant users and are also contributing to the further development of the technology. The Magnetic Fusion and Naval Reactors programs have been using supercomputers for many years. Other DOE programs such as Uranium Enrichment, High Energy and Nuclear Physics, Basic Energy Sciences, and Biological and Environmental Research have just begun to make significant use of supercomputers.

Great progress has been made in our ability to do computer modeling of complex scientific problems; however, there is still a long way to go. Many of the Department's research and development programs have large, complex research and engineering problems to solve that can be only crudely approximated with today's supercomputers and mathematical techniques. There is a need to include more physics in the models, to use finer zoning for more accurate answers and to attempt to model in three dimensions. In order to solve these complex problems to the accuracy desired in the future, computers with substantially increased computing power over those currently available will be required. Several DOE programs have estimated that they will require computers 200 times as powerful as a Cray XMP or a Cyber 205 by the end of the decade. In fact, some of the DOE programs could use that kind of computing power today, if it were available.

Applied Mathematical Sciences Supercomputing Research

The primary objective of the research activity is to advance the understanding of the fundamental concepts of mathematics, statistics, and computer science underlying the complex mathematical models of the key physical processes encountered in the Department's research and development programs. In addition, this activity supports investigations of new computer architectures that may lead to new approaches to supercomputers. The research activity provides the primary source of funding for applied mathematics and computer science research to meet the DOE needs in this area.

The DOE scientific research community comprises a large fraction of this country's expertise in large scale computational modeling, with applications in fusion energy, weapons design, and fundamental physical scientific research. Much of the scientific research and development effort throughout DOE programs is focused directly on analytical and numerical modeling of physical processes. An understanding of the fundamental principles upon which these models are based is important for developing energy production and distribution systems for the future. Thus, research in mathematical analysis, algorithms, and computational techniques is crucial in conducting most scientific investigations. DOE's lead role in the development and application of supercomputing techniques is based on this fundamental research.

One goal of the research activity is to develop our ability to use parallel processor computer systems to model complex physics phenomena. The parallel processor direction for supercomputers is dictated by the fact that only very limited gains can be made from increased component speeds and levels of integration in the future. This has caused computer architects to look to using more than a single processor working on a problem. In the near term, the supercomputer vendors are producing systems with 2-16 processors. In the longer term, systems with 100's to 1000's of processors are expected. The change from von Neumann (sequential) to parallel processor machines represents an enormous change in scientific computing, greater than the challenge faced by the introduction of vector processors. The challenge with parallel processors is to have a large number of processors efficiently working simultaneously on the same problem. New software, languages, algorithms, and entirely new mathematical approaches to solving scientific problems will be required.

This subprogram supports basic research at many of the DOE national laboratories, universities, and private research institutions in three major activities: Analytical and Numerical Methods, Information Analysis Techniques, and Advanced Computing Concepts. Analytical and Numerical Methods includes analytic and numerical techniques for solving systems of partial differential equations; Information Analysis Techniques includes data management and statistics; Advanced Computing Concepts includes software methodology and research on high performance systems. Regular meetings with program managers in other Federal agencies help coordinate these activities. Two such groups established to coordinate government sponsored research programs are the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET) panel on high performance computing research and the Interagency Committee on Extramural Mathematics Programs (ICEMAP). DOE is one of the ICEMAP sponsors of the new Board for Mathematical Sciences in the National Research Council of the National Academy of Sciences.

Recent accomplishments of this research activity in computational science include the following:

- A fast algorithm, called "successive linkage," well suited for lattice problems involving large summations of potentials with local interactions was discovered. The key step in this algorithm is the identification of frequently appearing terms in the summation together with a method for estimating the frequency with which a given term appears. It has been tested on the exactly solvable two-dimensional Ising model which is used to describe ferromagnetic materials and yields best possible results among all exact summation algorithms for finite square lattices. Extrapolation methods were also developed which enable one to accelerate convergence to thermodynamic limits in infinite lattices.

- A new class of high resolution finite difference methods for modeling compressible fluid flow problems with discontinuities has been developed. These methods incorporate the nonlinear wave propagation properties into the algorithm, leading to methods that are stable and robust in the neighborhood of shock waves and slip surfaces and are still highly accurate in regions of smooth flow. These methods have resolution capabilities that are close to the theoretical maximum attainable and represent a major advance in the state of the art that is unlikely to be surpassed in the near future. These methods are being incorporated into large application programs used in the weapons design and laser fusion projects.

- The University of Illinois established the new Center for Supercomputing Research and Development whose goal is to demonstrate the effectiveness of their "CEDAR" design strategy for parallel architectures and associated algorithms and software. Major support for the Center is being provided by DOE; the State of Illinois is providing faculty positions and building space. Center faculty and staff consists of interdisciplinary teams with expertise in problem decomposition, parallel algorithms, architectures, and networking, including close collaboration with the Mathematics and Computer Science Division at the Argonne National Laboratory. Leaders from the supercomputer industry have applauded the formation of the Illinois Center and state that such centers are the appropriate places to carry out the research required for new generations of supercomputers.

In FY 1985, an enhancement in the research effort in large scale scientific computing was started, with emphasis on algorithms for large scale parallel architectures based on several experimental computer systems under study. The emphasis on new parallel processor architectures applies to all three activities of the research subprogram.

The R&D projects envisioned have two important facets requiring substantial cooperation and coordination among traditionally separate groups. One facet is the interdisciplinary teams of computational scientists, computer scientists, and mathematicians working on all aspects of large scale scientific computing problems. The other is the cooperation of industry, government and universities on the design and engineering of examples of several potentially strong candidate architectures; this will be an important proof of concept activity.

University researchers will play the major role in generating ideas and research software and in training graduate students in generating new applications. Government laboratory staff are in the forefront of tackling real world, large scale scientific problems and have unique resources for participating in these research projects. Industry likewise has a unique role in providing state of the art production and testing facilities and would stand to reap great benefits in understanding future architecture and software issues that tend to limit industry use of supercomputers currently. The transfer of technology from the academic and laboratory research environment to industry will be as rapid as possible through these cooperative projects. The DOE program will be coordinated with the other agencies to share common facilities where possible, such as very large scale integration (VLSI) design facilities and component fabrication.

This subprogram supports interdisciplinary teams including analysts, applied mathematicians, computational scientists, postdoctoral fellowships and graduate students collaborating in universities and national laboratories to research parallel algorithms for mathematical software tools used in implementing these models. As documented in the David Committee's report, "Renewing U. S. Mathematics: Critical Resource for the Future," published by the National Research Council of the National Academy of Sciences, DOE's research program in applied mathematical sciences plays a lead role in support of basic research at the interface between mathematical and computational sciences. The shortage of graduate students and post doctoral support in this crucial area is becoming severe and the current demand for trained computational scientists by industry is rapidly draining the academic pool and the pool of talent available to the National Laboratories. The intent is to strengthen the ties between universities and the Laboratories and to provide salary support and computational resources in the disciplines associated with computational science. The DOE program, with its unique history of basic research in these areas, is positioned to provide strong leadership in filling the "pipeline" from graduate studies to post-graduate studies to research positions in academia and the Laboratories.

Several projects were begun in FY 1985 at the level of between $1,000,000 and $2,000,000 per year to provide for fabrication and software development of parallel architecture research machines. Each project represents a collaboration among universities, national laboratories, and private industry. Funding to support the completion and operation of these research machines is required in order to make these facilities available to researchers at other universities and laboratories via a national network.

The most advanced of these is the Cal Tech Cosmic Cube project initiated by DOE in 1983. In 1984 a 64 processor version of the Cosmic Cube (6-cube) was running a variety of scientific problems, including lattice gauge calculations of the heavy quark potential, problems in astrophysics, seismic exploration, chemical dynamics, and the traveling salesman (simulated annealing) algorithm. The research team supported by DOE includes faculty and graduate students from physics, applied mathematics, computer science, chemistry, geophysics, and engineering. In addition, visitors from DOE laboratories and other universities are participating in this project under separate support. Intel and DEC donated a large amount of equipment to this project. Intel recently announced the commercial version of the 5, 6, and 7-cube based on the new Intel 80286/80287 processor set. Problem decomposition techniques and multiprocessor software is available from the Cal Tech group. Interest in acquiring the Intel cubes has been expressed by at least three DOE laboratories and several universities. In FY 1985, a 128 processor version of the Cosmic Cube (7-cube) was brought up and continues to run reliably.

Research completed to date has demonstrated the viability of this approach for the homogeneous system design. The scalability of this architecture to very large scale parallelism in a variety of problems needs to be verified experimentally. This requires continuation of the current plans to an experimental machine capable of handling problems of realistic complexity. In FY 1986, the project plans to continue the relationship with the Jet Propulsion Laboratory's engineering and fabrication resources to build a much more general purpose version of the Cube, using a modern microprocessor with vector floating point capabilities (a shortcoming of the 16-bit Intel chip in the first Cube). This experimental machine will offer modern operating system utilities that will provide a much more general environment for scientific problem solving.

These projects represent several investment strategies. The first is a collaboration with a large industrial partner providing engineering design and implementation, with a well known DOE Laboratory/university partner providing the mathematical and computer science expertise for scientific applications. The second represents a large DOE supported university group providing again the mathematical and computational science expertise and a government sponsored laboratory providing the engineering design and implementation. The third represents a large, experienced university and laboratory group using mostly "off the shelf" components and far advanced in the development of software for scientific applications.

The FY 1987 request is $22,650,000. Plans for additional facilities and capital equipment projected for the large projects will be deferred until later years, when suitable research machines can be made available. The FY 1987 capital equipment budget request is $500,000.

Energy Science Advanced Computation

With the advent of modern supercomputers and the maturing of computational techniques, computational science has joined experiments and analytical theory as an equal and very essential tool in the advancement of science and technology. The Energy Science Advanced Computation program provides computational support for research programs (other than Magnetic Fusion) that are supported by DOE's Office of Energy Research (OER). These OER programs include High Energy and Nuclear Physics, Basic Energy Sciences, and Biological and Environmental Research. The goals of the Energy Science Advanced Computation program are:

- to provide access to modern supercomputer systems for researchers that are funded through the OER programs;
- to build the knowledge base needed to improve computational technologies throughout the OER programs;
- to provide more effective computational tools for supercomputer systems in use by the OER programs; and
- to shorten the lead times required to implement the results of the OER Supercomputer Research program into existing OER applications and supercomputers and systems software.

The OER researchers served by this program are geographically dispersed throughout the United States and have collaborations with research communities overseas in Europe and Japan. During FY 1985, an enhanced Class VI computer system was installed at the National Magnetic Fusion Energy Computer Center (NMFECC) to provide computational support to these OER programs through the nationwide Magnetic Fusion Energy data communications network (MFENET).

This enhanced Class VI computer system has been very instrumental in the progress of the OER research programs, such as designing and modeling of the physics of high power klystrons, determining the electron energy band structures of new classes of materials, e.g., heavy fermion materials, and ecological modeling the theory for "faunal buildup of competition communities." This enhanced Class VI computer system has been operating at over 90% utilization level (24 hour/day, 7 days/week) since its second month of installation.

Recent accomplishments in the Energy Sciences Advanced Computation activity include the establishment, during FY 1985, of a Supercomputer Computations Research

Institute (SCRI) at the Florida State University, the expansion of the MFENET to include over twenty (20) new geographical sites, the addition of over 1200 supercomputer users actively engaged in OER research projects at the NMFECC, and the development of the first timesharing operating system for operation on a multiprocessor supercomputer configuration. This operating system is targeted for use at two of the new NSF supercomputer centers during FY 1986 and will be supported by the NMFECC. The SCRI was established via a cooperative agreement to conduct research in computational science related to the OER mission, to develop effective computational tools and systems software for use on supercomputer systems, and to operate a supercomputer facility. The SCRI installed a CDC Cyber 205 computer system, of which approximately 65 percent of the system capacity was used for OER related work and over 80% of this capacity had been allocated to university researchers. This operation was also incorporated as a major node on the MFENET for nationwide access.

For FY 1987, a total of $10,135,000 in operating funds is requested. Based on the need to balance the budget, funding for the Florida State Computer Center has been eliminated. These funds will be used to provide additional network capabilities for this supercomputer access program including remote user processor upgrades, replacements and installations, to provide a replacement file management/mass storage system for the obsolete CDC 7600 and 38500 cartridge devices, and to allow for increases at the NMFECC for supplies, utilities, salaries, communications lines, and hardware maintenance. The distribution of costs is: $1,600,000 for network access facilities and equipment; $500,000 for lease-to-ownership of a file management systems and mass storage; and $8,635,000 for lease and operation of the enhanced Class VI computer system. However, due to the magnitude of the increases for software, support costs and communication bandwidth upgrades, the current lease of the enhanced Class VI computer system will be converted to a lease-to-ownership arrangement.

Also, it should be noted that separately identified under this activity is a Major Item of Equipment, a Class V computer system which was initially procured in FY 1986, at the Argonne National Laboratory (ANL). This system while only partially funded in this program is essential to replace an existing outdated system at the ANL.

For FY 1987 capital equipment funds in the amount of $600,000 are requested to provide replacement parts and low cost mass storage peripherals at the NMFECC.

	FY 1985	FY 1986	FY 1987 Request
Engineering and Geosciences			
Operating Expenses....................	$ 26,085	$ 25,571	$ 29,412
Capital Equipment.....................	1,500	1,443	1,750
Construction..........................	0	7,698	0
Subtotal........................	$ 27,585	$ 34,712	$ 31,162

This subprogram provides for the principal research efforts of the Department of Energy in the various areas of engineering and the geosciences, particularly in the disciplines of mechanical engineering, electrical engineering and engineering physics, geology, geophysics and geochemistry. Research projects are selected for scientific excellence and their expected long-term impact on solutions to the Nation's energy-related problems, ultimately to meet the Nation's need for adequate energy supplies at reasonable costs.

The FY 1987 request, $29,412,000 for operating expenses and $1,750,000 for capital equipment, provides for maintaining a sound balance of activity in each of the established areas of program focus, with about the same number of engineers and geoscientists participating in these important aspects of energy research as were involved in FY 1985.

The research to be supported with the requested operating funds is discussed in some detail below. The capital equipment funds requested will be for equipment urgently needed at the national laboratories such as testing and measuring equipment needed for plasma processing research at the Idaho National Engineering Laboratory (INEL), various devices and accessories needed for research at Oak Ridge National Laboratory on intelligent machines for repair and other operations in hostile, changing environments, and for detectors and signal processing equipment needed for research on advanced seismic and electromagnetic methods in geophysics at the Lawrence Berkeley and Livermore National Laboratories.

Engineering Research

Engineering Research in this subprogram pursues two main objectives to meet the long-term basic research needs of both current and future energy technologies: (1) to improve and advance our knowledge of processes underlying current engineering practice for the purpose of enhancing energy production and savings, prolonging useful equipment life, increasing the efficiency of energy systems and reducing costs of operation while maintaining output and performance quality, and (2) to expand the technical data base and knowledge of fundamental concepts for solving anticipated and unforeseen engineering problems in energy technologies. Fundamental research is supported in both traditional engineering disciplines and interdisciplinary areas, addressing problems related to energy production, distribution, and utilization.

The breadth of application and the character of the research projects supported in Engineering Research are shown by the impact of the results on various energy technologies. For instance, the principles underlying the flow of multiphase fluids (i.e., mixtures of gas and liquids) must be well understood to solve many problems in the petroleum and chemical industries as well as in specific energy supply systems; for example, geothermal, nuclear and solar. Research on generic topics such as these is essential to ensure preparedness and flexibility in addressing the Nation's future energy needs, as well as competitiveness in world markets.

To optimize its impact and use of funds, Engineering Research focuses its research activities on three main categories: (1) Mechanical Sciences, (2) System Sciences and (3) Engineering Data and Analysis. Research supported under the Mechanical Sciences focus includes: fluid mechanics, heat transfer, combustion, solid mechanics and structures, damage and fracture mechanics, and tribology. Systems Sciences includes: systems analysis, synthesis and control, large scale systems, intelligent machines in changing environments, and instrumentation research. Research under the third focus, Engineering Data and

Analysis, includes: the development of important critically evaluated data for energy engineering, mathematical modeling of systems far from equilibrium, and modern engineering analysis, such as analysis needed for understanding the dynamics of nonlinear systems.

Significant accomplishments in Engineering Research have been numerous. A sampling of some of the more recent accomplishments are given below:

- o Research on the non-linear interactions between chemical reactions and transport phenomena aimed at understanding aspects of geo-engineering important for uranium mining has unexpectedly yielded new strategies for petroleum exploration. Two major oil companies (Texaco and Exxon) now fund extension and testing of the new techniques.
- o Research on the interaction between fluid flow and tube bundles in heat exchangers has led to the discovery of a key source of undesirable noise generation in these essential energy system components. This knowledge will aid the design of efficient, environmentally acceptable (low noise pollution) heat exchangers.
- o Critical laboratory experiments have revealed severe limitations on commonly used computer simulation of flow phenomena in enclosures. The results of this research are now used to improve calculation methods for complex heat transfer problems.

The FY 1987 request for this subprogram will provide $14,062,000 for Engineering Research operating expenses. The overall level of effort for Engineering Research will thus be brought back to that of FY 1985. This will provide for strengthened implementation of several efforts for which the first substantial funding was in FY 1985, including both integrated, multidisciplinary efforts (at ORNL, INEL and MIT) and complementary, single investigator-initiated research in small businesses and at universities.

Geosciences

The objective of the Geosciences research is to develop, in areas pertinent to the nation's energy needs, a quantitative and predictive understanding of crustal structure, earth processes and the solar terrestrial interface along with associated advanced techniques and instrumentation.

The earth and the sun are the sources of the world's energy supply. The earth and its atmosphere are the sinks for the wastes generated by energy-producing processes. Thus, increased knowledge in the geosciences is highly important to meeting the Nation's future energy needs. There is need for the development of more advanced methods of energy resource recognition, evaluation and utilization. There is need for an enhanced fundamental understanding of the composition, structure, dynamics and evolution of the earth's crust and how such processes affect natural phenomena such as the distribution of energy and mineral resources, earthquakes, volcanic eruptions, storage and transfer of geothermal energy, the occurrence of fossil fuels and the nature and extent of aquifers.

Geosciences research is carried out principally at the DOE National Laboratories and at universities. The program supports long range research chosen for its scientific merit as well as its special long-term relevance to energy technologies. For example, coordinated projects in geochemical migration and continental scientific drilling address directly and indirectly important long range national energy concerns. Seismic activity, tectonic uplift and increased fumarolic activity at Long Valley-Mono Craters in California have stimulated detailed studies of this area under the DOE Continental Scientific Drilling effort. These studies are part of the joint DOE-NSF-USGS program endorsed last year in a special statutory provision (P.L. 98-473, Section 323).

Geochemical studies of element migration and energy and mass transfer are providing the knowledge base needed to understand the mechanisms of energy and mass transfer in hydrothermal systems, the movement of wastes from geologic repositories, and the concentration and location of energy resources. Research in organic geochemistry is yielding an improved understanding of the origin, development and emplacement of gas, oil and coal deposits and is helping develop a cadre of organic geochemists in U.S. universities where a shortage has existed for many years. Studies of the temperature gradients and tectonic history of subsiding basins lead to a better understanding of the development of energy resources in nature and thus to their more effective exploitation. Development of new geophysical systems and their use in resource exploration are leading to improved methods of locating and defining energy resources and for modeling crustal systems. Recent Geosciences accomplishments include the following:

- Cooperative Seismic Studies at Long Valley, CA. The interagency, cooperative nature of the geophysical studies relating to DOE scientific drilling activities in the vicinity of the Long Valley Caldera is illustrated by the fact that four Federal agencies are involved, one state agency, seven universities and one industry in an effort totaling about $2.8 million with DOE providing about 20 percent of the total costs. This concerted effort is attempting to pin down the three-dimensional configuration of the Long Valley/Mono Craters area and determine the locations of magma bodies. The overall effort was initiated as a direct result of the careful, nationwide search under the auspices of the BES Geosciences activity for sites most likely to fulfill the scientific objectives for continental scientific drilling in regions of high heat flow (i.e., in thermal regimes).

- Field Tests Carried Out of Alterant Geotomography. Tomography has become familiar in medical applications, but suitable data are rarely available for imaging sections of the earth below the surface. A new technique for this purpose features use of electromagnetic waves and injection of conductive (or insulating) fluids through bore holes to alter the conductivity. The first field test was just completed. The "before," "after" and "difference" images clearly show permeable pathways through which the injected fluid moved.

The request for FY 1987 operating expenses for Geosciences is $15,350,000. The request will enable program support at about the FY 1985 level of effort and permit the strengthening of the small but profoundly influential project on worldwide effects of past asteroid impacts. To the extent possible within this framework, the Department's thermal regimes drilling activities will be maintained as a key part of the interagency Continental Scientific Drilling Program.

	FY 1985	FY 1986	FY 1987 Request
Advanced Energy Projects			
Operating Expenses......................	$ 10,048	$ 7,286	$ 8,932
Capital Equipment.......................	320	308	330
Total Advanced Energy Projects.......	$ 10,368	$ 7,594	$ 9,262

The objective of the Advanced Energy Projects subprogram is to explore the feasibility of novel energy-related concepts, as they evolve from basic research. Such concepts are at an early stage of scientific definition and, therefore, would not qualify for support by technology programs. Because they are new and untried, those concepts invariably represent a high risk; to qualify for support they must also have the potential for an eventual high pay-off. Also supported is exploratory research on concepts that do not fit easily into the existing Department of Energy program structure. An area of major programmatic attention is the transfer of successful projects to proper technology programs; such transfers are effected every year.

Exploratory research on novel concepts is needed to provide the seed for technical innovation. However, such research does not generally qualify as basic research, where the objective is to gain knowledge and understanding of processes and phenomena in nature. Neither does it qualify as technology-related: the link with any specific technology needs yet to be established. Hence, the Advanced Energy Projects subprogram fills a very real void between basic and technology-related research.

Thus, for example, several novel approaches to controlled fusion--very different from those currently pursued--have been proposed as a result of basic research. One such approach, known as "muon-catalyzed fusion," evoked considerable interest and produced unexpectedly promising results; however, this research is still at too early a stage to determine if muon-catalyzed fusion can be considered a viable process for energy generation. The concept is actively being explored under Advanced Energy Projects sponsorship.

The mode of operation for this interdisciplinary subprogram is to support individual projects for a limited time only; it differs from other subprograms in that it does not fund ongoing evolutionary research. The spectrum of projects supported is very broad, encompassing, for example, the development of new sources of electromagnetic radiation, new methods of better fossil fuels utilization, totally new approaches to controlled fusion and new approaches to solar energy collection and utilization. Close contact is maintained with DOE technology programs to ensure proper coordination. Projects are selected on the basis of unsolicited proposals received from researchers at universities, industrial laboratories (especially small R&D companies) and national laboratories.

In FY 1985, about 40 projects are being supported, which allows a turnover rate of about 14 projects a year. A recent accomplishment of Advanced Energy Projects is the demonstration, for the first time, of a laboratory-scale x-ray laser; the range of potential applications is very broad and includes medicine, microlithography and materials research--to name a few. Also last year, a free electron laser (FEL) experiment supported by Advanced Energy Projects yielded new results of break-through proportions, making FEL a leading candidate for powering new generations of particle accelerators, as well as for other applications.

The FY 1987 request for the Advanced Energy Projects subprogram is $8,932,000 in operating expenses and $330,000 in capital equipment funds. This will maintain the total number of projects supported at about 40 and will allow continuation of the initiative in exploring new sources of electromagnetic radiation such as laboratory scale x-ray lasers. Support for the muon-catalyzed fusion effort will continue at slightly enhanced funding levels.

Biological Energy Research	FY 1985	FY 1986	FY 1987 Request
Operating Expenses....................	$ 12,360	$ 11,960	$ 14,538
Capital Equipment....................	560	515	610
Construction..........................	0	5,773	0
Total Biological Energy Research....	$ 12,920	$ 18,248	$ 15,148

The Biological Energy Research (BER) subprogram supports research activities in both the plant and microbial sciences. The objective of this subprogram is to obtain the fundamental knowledge required for the future development of biological systems that produce or conserve energy resources. The research emphasis is directed towards understanding biological mechanisms. The program areas in the botanical sciences are directly related to plant productivity, including research on the main energy supply mechanism for living organisms, photosynthesis and the related fields of plant bioenergetics and metabolism. Research on the structure and function of the complex carbohydrates that make up the plant cell wall are of particular interest as these chemicals not only provide structural support for the plant, but also constitute the major renewable energy resource. Recently, the carbohydrate components of the cell wall have been implicated in having significant roles in plant regulatory processes, development and protection against pathogens. Studies are supported on the molecular mechanisms involved in the regulation of plant metabolism and development which are again directly related to plant productivity and energy conversion efficiency. The molecular events involved in the adaptation of plants to environmental stresses, as well as the molecular and cellular interaction of plants and microorganisms, both symbiotic and pathogenic, are likewise areas of interest as these interactions are often the limiting factors in plant growth. Research on the physiological genetics of plants and the associated genetic expression mechanisms can provide the information necessary to develop plant types with superior characteristics for efficient plant resource production.

The microbiological studies supported by the BER program are primarily concentrated in the areas relating to fermentation biology and to the interaction of microbes with plants. The objective of the fermentation research is to understand, at the molecular and cellular level, the microbial conversion of renewable substrates to potential fuels, chemicals or chemical feedstocks. The research emphasis is on the degradation of the major biological polymers, cellulose, hemicellulose and lignin. The degradation of these polymers frequently involves several types of microbes acting in concert. The nature of these interactions and the enzymes that are responsible for the degradation process all are active subjects of research. Methane, a common end product from the natural degradation of polysaccharides, is generated by certain anaerobic bacteria. The process of methanogenesis and the study of the organisms responsible along with the study of other neglected microorganisms with the potential for novel and valuable fermentations, have been areas of special effort by the BER subprogram. Examples of the category of plant microbial interactions include studies on symbiotic nitrogen fixing bacteria and the microbial processes that alter the properties of soils such as the bacterial process of denitrification of soils.

In certain areas of biotechnology at least, it is becoming more apparent that the most serious limitation to achieving new genetically tailored products (particularly plants and certain microorganisms) is the lack of understanding of the traits to be altered ("targets"). Thus more attention is needed in understanding the fundamental genetics, physiology and biochemistry of organisms. Such studies must become more prominent to balance the very rapid progress being made in such areas as development and use of new genetic vectors for transmitting DNA, unraveling of questions of how genetic messages are read and expressed and other molecular biological areas. In fact, it might be said that the competitive U.S. position in regard to the application of genetic engineering in biotechnology could be undermined if insufficient attention is given to building the strong biological understanding needed to apply the elegant genetic techniques. Clearly, the U.S. maintains a commanding dominance in respect to the genetic aspects of biotechnology, but with respect to such areas of fermentation technology and natural products chemistry, no such lead exists.

Two representative research advances evolving from the BER program this past year include:

1. The obtaining of evidence from Raman microprobe spectrographic analyses that lignin, the noncarbohydrate portion of plant cell walls, exists in a highly ordered orientation with the aromatic subunits being arranged parallel to the plane of the cell wall. Such information could lead to the development of new strategies for performing chemical and microbial degradations.

2. The pigment, phytochrome, which controls numerous morphological developments in plants, has only recently been shown to exist as two distinct molecules, one as found in dark grown (etiolated) plants, and the other as typically found in light grown green plants. The protein characterization has been performed in association with cloning of the genes for these proteins. Such results could lead to a better understanding of light controlled development in plants and ultimately plant productivity.

The funding requested will permit the continued support of current projects at adequate funding levels, with enhanced support being allocated for several ongoing projects in the area of complex carbohydrates and several neglected areas of plant and microbial research. A recent workshop on future research directions has identified these currently funded areas and several other research opportunities as meriting a high priority for enhanced funding. An effort also will be made to respond to a few of the numerous very high quality research opportunities presently available in these areas.

	FY 1985	FY 1986	FY 1987 Request
Program Direction			
Operating Expenses........................	$ 3,830	$ 3,499	$ 4,125
Total FTE's..............................	63	63	63

The FY 1987 request for Basic Energy Sciences Program Direction is $4,125,000. These funds are required to provide for the personnel and other costs associated with 63 full-time equivalents. The additional funds will provide for within-grade and merit increases, and other increased costs associated with management of this program.

Basic Energy Sciences is a broadly diversified program responsible for mission-oriented research, the chief purpose of which is to provide the fundamental scientific and engineering base on which the Nation's future energy options depend. Its staff must possess expertise covering many subfields in the areas of chemistry, physics, engineering, metallurgy, geosciences, mathematics, and biology, as well as in administration, procurement and financial management. The staff is responsible for development, direction, and management of complex technical programs, each involving one or more of the scientific areas mentioned above. Their activities include assessing scientific needs and priorities of the program, planning to meet those needs, technical review of proposals from laboratories and universities, and monitoring the progress of ongoing university contracts, laboratory programs, and construction projects, as well as responding to the many day-to-day requirements involving budget, procurement and other management activities.

The research effort involved in the Basic Energy Sciences program is extremely diverse. In FY 1986, for example, over 1,200 research projects will be underway either at the Department's laboratories or at more than 150 colleges and universities in 45 states. Evaluation, monitoring and management of this large number of diverse projects are done almost entirely from the Headquarters and require frequent contact with the contractors and laboratory staff, involving numerous workshops, planning meetings, and project and program reviews throughout the year. During recent years the number of research projects at universities, with industry and not-for-profit organizations has increased from 18 to nearly 30 percent of the BES budget, and the BES staff workload per offsite project is significantly greater than that for a laboratory project. This is especially true with regard to evaluation of proposals, of which approximately 10 percent of those reviewed result in new contracts or grants each year. The requested staffing level is required to maintain a strong core program; to evaluate research programs including those in newer emerging priority areas having great potential importance to energy; to oversee management, operation, and ongoing construction of unique research facilities; and to promote early application of the results of this basic research.

In addition to the ongoing basic research program, the Congressionally mandated SBIR program (Public Law 97-219) is managed by this staff. This program has resulted in a heavy workload requiring extensive use of overtime and diversion of other scientific and administrative staff from their regular duties to assist in the SBIR work. FY 1986 is the first year all three phases of the program are in operation at the same time. This results in increases in the numbers of proposals to be processed and evaluated, procurements and projects to be monitored and evaluated, site visits for those projects entering Phase II, and debriefings requested by proposers not receiving awards. This effort will continue during FY 1987.

The BES program also funds the Scientific Computing Staff which was established to manage two important activities related to large-scale scientific computing: (1) the Applied Mathematical Sciences research subprogram, with research projects at ten national laboratories and over 30 universities, and (2) the Magnetic Fusion Energy Computer Network, which supports supercomputers for over 2,000 ER research contractors. Specific workload includes assessing scientific needs and priorities of the program; planning to meet those needs; managing a large number of research projects, including conducting peer reviews and evaluating proposals from laboratories and universities; monitoring the progress of ongoing university contracts and laboratory programs; managing the Magnetic Fusion Energy Computer Network; and providing a single DOE focal point to maintain liaison with other Federal agencies on policy matters concerning basic research and access to supercomputers.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
BASIC ENERGY SCIENCES
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

2. Project No.: 84-ER-111

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3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr., FY 1984

4. Date construction ends: 4th Qtr., FY 1987

5. Previous cost estimate: $19,428

6. Current cost estimate: $ 19,428
Less FY 1983 PE&D: 0
$ 19,428

Date: January 1986

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 2,500	$ 2,500	$ 2,500	$ 1,396
1985	7,400	7,400	7,400	3,290
1986	6,928	6,928	6,928	6,528
1987	2,600	2,600	2,600	8,214

8. Brief Physical Description of Project

Current program planning anticipates the need for the insertion devices (wigglers and undulators) and beam lines (front and end beam transport and experimental stations) to the existing VUV and X-ray rings. Design, fabrication and construction of up to three insertion devices and six beam lines is presently anticipated with the final configuration to be dictated by programmatic demands and the state of the art at the time of construction.

The project also provides for design and construction of building space to house technical work areas, laboratories and offices and provide additional experimental staging and support areas.

1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

2. Project No.: 84-ER-111

8. Brief Physical Description of Project (continued)

A. New Experimental Equipment

This project provides for an expansion of experimental capabilities which will be made available to general users from university, industrial, national and government laboratories. The greatest use is anticipated to be by materials scientists, but sizeable participation is expected by chemists, biologists and other disciplines.

The new equipment will consist of a new wiggler device and the upgrading of a second wiggler, two associated beam lines and ancillary equipment; a soft X-ray undulator and associated beam line; and an infrared beam line. The exact design of this equipment will be determined as the project progresses.

B. New Building Addition

The proposed addition to the NSLS building will provide support and staging areas, laboratories, technical work areas and offices to promote more effective utilization of the NSLS facility. The technical staff will move to new work areas, making more space available for the new beam lines. Extending the experimental space adjacent to portions of the VUV and X-ray storage rings will allow a number of long beam lines with new capabilities to be constructed, permit additional branching of existing ports, and give some extremely useful space to users for specialized support equipment.

The expansion will add approximately 56,500 square feet of new space in a two-story addition on the north and east sides of the existing building.

The ground floor includes expanded experimental areas for X-ray and VUV storage rings, an angiography suite, laboratories, offices, technical work areas, a receiving and gas storage area, expanded lobby, mechanical equipment rooms and several public rooms. A tunnel connecting the ground floor to technical work space in an adjacent facility will be provided. First floor gross area is 28,912 square feet.

The second floor includes offices, technical work space, design and conference rooms and a mechanical equipment room. Second floor gross area is 27,569 square feet, larger than the original concept by 4,650 square feet in order to accommodate the increased need.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

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8. Brief Physical Description of Project (continued)

The additions will be designed to current DOE energy conservation standards and contain fire protection systems. Access by handicapped persons will be provided.

C. Existing Facility

The NSLS consists of two electron storage rings, an injection system common to both, experimental beam lines, experimental equipment, and office and support area all of which is housed in a 74,000 square foot building.

The 2.5 GeV X-ray storage ring provides for the possibility of 28 primary beam ports, each of which is capable of accommodating several experimental beam lines. The VUV ring provides for 16 beam ports which are also capable of accommodating several experiments each. In sum, more than 90 experiments can be carried out at one time when the facility is fully instrumented. In addition to general users, research groups called Participating Research Teams (PRT's) from universities, industry and national and government laboratories, upon advice by a program committee, and approval by the NSLS Department Chairman provide instruments to carry out research programs at the NSLS facility. Their instruments are made available to general users for 25% of the available time. General users are able to use any of the experimental lines, PRT or community lines, upon approval of their experimental proposal. The NSLS is operated as a user facility. This means that researchers from BNL and other laboratories will be able, after review of a proposal by a committee of distinguished scientists, and acceptance by the NSLS Department Chairman to carry out an experiment using either the UV or X-ray radiation produced by the rings.

9. Purpose, Justification of Need for, and Scope of Project

The response from users, both within BNL and outside, has placed a demand on the NSLS facility far surpassing its present resources. The limited beam lines combined with the limited space available makes expansion of experimental research within the present confines of this facility unpracticable. In order to support further development of this facility it will be necessary to provide additional floor, laboratory, and staging space. An experimenter should have a choice of a wide range of instruments which he can utilize for this research. To provide this choice, two types of instruments are proposed:

1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

2. Project No.: 84-ER-111

9. Purpose, Justification of Need for, and Scope of Project (continued)

a) The insertion device beam lines and the infrared beam line will provide a range of wavelengths and intensities not presently available at bending magnets. These instruments will be used both by general users and by members of the Insertion Device Teams (IDT's).

b) Instruments for general users that will complement those already provided.

A. New Experimental Equipment

The original development plan provided for a small number of bending magnet beam lines. Further instrumentation, also originating in bending magnets, was to be made available by Participating Research Teams (PRT's), who installed beam lines at the rings at their expense and made 25% of the experimental time on their lines available to general users. The growth in user participation has far exceeded earlier expectations.

Developments in recent years has given a high scientific priority to insertion devices. In order to provide this important new experimental capability at the NSLS, it is proposed to accelerate beam line construction. Following the recommendations of the previously noted study committees, it is essential to provide insertion beam lines at the earliest possible date.

B. New Building

The design for the original NSLS building emphasized long term space requirements for the accelerator/storage rings and the equipment associated with their control and operation. Adequate space for experimental beam lines around the VUV and X-ray storage rings was also provided. Future long beam lines that extended beyond the building walls were regarded as a future option.

The space for the machine and experiments was given highest priority in initial design, while support areas were provided to satisfy requirements for projected use during the initial years of operation. A possible expansion of experimental support areas, work areas, and offices was allowed as a future option. Therefore, only minimal space was given to laboratories, the second floor office-administration area, and other support areas. A portion of the

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2. Project No.: 84-ER-111

9. Purpose, Justification of Need for, and Scope of Project (continued)

X-ray experimental floor was occupied by technicians until such time that a need would arise to instrument Ports X1 through X8.

It was projected that during the early years of operations, up to approximately 50% of the 28 X-ray and 16 UV ports would be utilized. Currently, there are 18 beam lines operating at the X-ray ring, 7 more will be ready for operation this year and an additional 17 are in various stages of planning. In the VUV, there are 13 operating, 11 more that will soon be operating, and 11 in planning. The extremely enthusiastic response of the scientific community now forces us to advance the expected rate of beam line construction and building expansion. This response, coupled with the beam lines to be provided by the project, indicates that the experimental floor will be extremely crowded and additional support space would be essential.

The original design anticipated a possible need for future expansion. The building frame was designed to support a third floor over the office administration wing. Site utility lines were kept at least 30 feet from the building foundation. Adequate space was left between the NSLS buildings and the Safety and Environmental protection building.

In addition to the pressing need to return experimental floor space to its intended use, the expansion will provide adequate office space for the permanent staff and work areas to complement the research and development associated with the anticipated programs. The short connecting tunnel between the NSLS building and the basement of the adjacent Instrumentation building will connect the NSLS staging areas to an area where extensive vacuum, instrument, and other NSLS support activities are located.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

2. Project No.: 84-ER-111

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9. Purpose, Justification of Need for, and Scope of Project (continued)

Annual Costs

The estimated incremental operating costs of the proposed NSLS beam lines and support area construction are listed below. Costs are in FY 1986 dollars.

	(Dollars in Thousands)
Materials, Supplies, Support Services	$108
Electric Power	278
General and Administrative	46
Total	$432

10. Detail of Cost Estimate [a]/[b]/

	Item Cost	Total Cost
a. Engineering, design and inspection, including A-E fee	$	$ 4,080
b. Land and land rights		0
c. Construction costs		12,998
(1) Beam line construction	5,763	
(2) Sitework	105	
(3) Structures	6,730	
(4) Facility Modification	400	
d. Standard equipment		640
Subtotal		17,718
e. Contingency		1,710
Total project cost		$ 19,428

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[a]/ Estimate is based on awarded conventional construction contract.

[b]/ Escalation rates conform to the guidelines prescribed in the Department of Energy Field Budget Process Chapter, August 1984, which are based on the materials and labor data contained in the Energy Supply Planning Model and escalation rates forecasted by Data Resources, Incorporated (DRI). Current costs have been escalated by 5.6%, 4.9%, 6.4% and 6.7% per year on beam line construction for FY 1984 through FY 1987, and 6.4%, 5.4% and 4.6% on conventional construction for FY 1983 through FY 1985.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

2. Project No.: 84-ER-111

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11. Method of Performance

Insertion device and beam line construction is unique and therefore the conceptual design, final design, assembly and testing will be done by the staff of the National Synchrotron Light Source of the Brookhaven National Laboratory. Component parts wherever possible will be fabricated by industry under fixed priced competitively obtained procurement actions. Some components may be fabricated in the existing shops at BNL. It is also anticipated that other laboratories, private consultants, and industrial firms will be used for advice on specific problems. Building design will be on the basis of a negotiated architect-engineer contract and its construction will be by a competitively obtained lump sum contract which may be phased.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project costs						
1. Total facility costs						
(a) Construction line item.........	$ 0	$ 1,396	$ 3,290	$ 6,528	$ 8,214	$ 19,428
(b) CP&D...........................	0	0	0	0	0	0
(c) Expense Funded Equipment.......	0	0	0	0	0	0
(d) Inventories....................	0	0	100	100	0	200
Total facility costs...........	0	1,396	3,390	6,628	8,214	19,628
2. Other project costs						
(a) R&D necessary to complete construction of beam lines....	900	500	500	0	0	1,900
(b) Other..........................	0	0	0	0	0	0
Total other project funding....	900	500	500	0	0	1,900
Total project funding..........	$ 900	$ 1,896	$ 3,890	$ 6,628	$ 8,214	$ 21,528

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

2. Project No.: 84-ER-111

12. Funding Schedule of Project Funding and Other Related Funding Requirements (continued)

b. Total related funding requirement (estimated life of project: 17 years)

1. Operating costs	$ 432
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort	0
4. GPP or other construction related to the programmatic effort	0
5. Other costs	0
Total other related annual funding requirements	$ 432

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
  1. Total Facility
    (a) Construction line item - no narrative required.
    (b) CP&D - no narrative required.
    (c) Expense funded equipment - no narrative required.
    (d) Inventories - it is anticipated that funds will be required for the procurement of special process spares.
  2. Other project funding
    (a) R&D necessary to complete construction - funds provided in the NSLS R&D budget. This item gives estimates of the R&D necessary to develop the monochromators, mirror systems, target chambers, detectors and superconducting structures for high field wigglers and undulators.
    (b) Other - no narrative required.

b. Total related funding requirements
  1. Operating Costs - There will be an annual requirement of additional materials, supplies, and support services associated with the new beam lines. Also, there will be a requirement for increased facility electrical power.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Beam lines and support area construction
National Synchrotron Light Source (NSLS)
Brookhaven National Laboratory, Upton, NY

2. Project No.: 84-ER-111

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (continued)

2. Programmatic operating expenses directly related to the facility - no narrative required.
3. Capital equipment not related to construction but related to the programmatic effort - no narrative required.
4. GPP or other construction related to the programmatic effort - no narrative required.
5. Other costs - no narrative required.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
BASIC ENERGY SCIENCES

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Center for Advanced Materials, Lawrence Berkeley Laboratory, Berkeley, California

2. Project No.: 84-ER-112

3. Date A-E work initiated: 3rd Qtr. FY 1984

3a. Date physical construction starts: 4th Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: $ 40,250

6. Current cost estimate: $ 40,450
Less FY 1984 PE&D: 200
$ 40,250
Date: January 1986

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 1,760	$ 1,760	$ 1,760	$ 437
1985	9,290	9,290	9,290	1,442
1986	11,008	11,008	11,008	10,174
1987	10,560	10,560	10,560	17,522
1988	7,632	7,632	7,632	10,675

8. Brief Physical Description of Project

The Center for Advanced Materials (CAM) is comprised of two research laboratories. This is a continuation of the FY 1984 request, Center for Advanced Materials (CAM), and which takes into consideration the recommendations of the ad hoc review Panel.

The Research Laboratories will involve two new laboratory complexes at LBL, the Surface Science and Catalysis Laboratory (SSCL) and the Advanced Materials Laboratory (AML).

The CAM facilities at LBL will be located on University of California property adjacent to the Berkeley campus, within the site of the Lawrence Berkeley Laboratory. The project will include the construction of new facilities,

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Center for Advanced Materials
Lawrence Berkeley Laboratory, Berkeley, California

2. Project No.: 84-ER-112

8. Brief Physical Description of Project (continued)

and the alteration of, and additions to, existing facilities. Plant and site facilities will consist of: a) improvements to land, including grading, drainage, paving, lighting, and walkways; b) a new Surface Science and Catalysis Laboratory (SSCL) building (approximately 47,000 GSF), located near the existing Materials and Molecular Sciences Laboratory (Building 62); c) the new approximately 80,000 GSF building, the Advanced Materials Laboratory (AML); d) the extension of existing utilities, including electrical power, water, sewage, gas, and communications; and e) standard equipment and special facilities including office and laboratory furniture and equipment, fume hoods, ventilation and temperature control equipment, laboratory diagnostics and instrumentation equipment, fire protection equipment and computation equipment.

The Surface Science and Catalysis Laboratory will be located near the existing Materials and Molecular Sciences Laboratory (Building 62). The 3-story building will have a reinforced-concrete frame, shear walls, waffle roof-and-floor structure supported on spread footings. Auditorium and administrative area roofs will utilize metal deck on steel framing. The floor plan is approximately 95 x 150 feet.

The Advanced Materials Laboratory will consist of a single light-laboratory building. The proposed four-story building will occupy a hillside site providing a first floor with a main entrance at the grade level of the base of the hill. The building will consist of two rectangular wings offset in the east and the west directions around a central core with a steel frame structural system. Foundations will consist of poured-in-place reinforced concrete caissons.

Finishes on the new buildings will include: standard built-up roofing over insulation; exterior (non-bearing) walls of prefinished panels on metal studs (insulated cavity); and gypsum board interior wall surfaces throughout. Acoustical ceilings will be needed in certain areas; otherwise ceilings will be painted gypsum board. Laboratory furniture and fume hoods will be commercial products with acid/alkali-resistant tops and construction. Building elevators will be rated for 6000 lb. capacity, suitable for carrying freight and passengers. Heating ventilating and air conditioning (HVAC) needs will be met by central station air-handling units, draw-through cooling coils, return fan units and economizer controls. All supply and return air will be ducted. All buildings will be equipped with automatic fire sprinkler and alarm systems. Utilities will be extended from nearby existing plant services.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Center for Advanced Materials Lawrence Berkeley Laboratory, Berkeley, California	2. Project No.: 84-ER-112

9. Purpose, Justification of Need for, and Scope of Project

This research center is being proposed as a major scientific redirection of the Lawrence Berkeley Laboratory to address a vital national need, to accelerate basic research in an area that promises medium-term impact on high-technology industries, and to foster closer ties between national laboratory researchers and their counterparts in industrial and university laboratories. The CAM project will have two major objectives:

- To enhance understanding, through long-range basic research, of the synthesis, characterization, and properties of advanced materials in support of U.S. energy-related and high-technology industry.
- To provide advanced facilities for research training of additional graduate students in physical sciences and engineering fields vital to U.S. high-technology industry.

The CAM project will provide the modern tools and facilities required for making possible major advances in energy-related and high-technology industries by improving the scientific understanding of the underlying chemical and physical phenomena that influence both materials and device behavior.

Two research laboratories form the major components of the CAM:

- The Surface Science and Catalysis Laboratory (SSCL). A laboratory devoted to surface and catalysis studies using state-of-the-art instrumentation techniques.
- The Advanced Materials Laboratory (AML). A laboratory devoted to interdisciplinary study of the synthesis and characterization of energy-related, high-technology, and strategic materials. In addition, there will be research on the design of high-technology devices utilizing new materials and the design of innovative devices for the characterization of materials-property relationships.

Both the SSCL and the AML will be based on strong programs that already exist at LBL. Other elements are completely new, but they too build on experience and personnel already at LBL and at the adjacent University of California Berkeley campus. The first CAM research program associated with the above was initiated in FY 1984.

Because of the pressing need to retain high-technology leadership, the proposed project schedule calls for the start of construction in FY 1984 and the completion of all facilities in FY 1988. Delays would extend the time at which research results can be generated and transferred to U.S. industry. A CAM Advisory Board composed of scientific leaders from industry, universities, and Federal laboratories will advise the LBL director on CAM scientific program

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Center for Advanced Materials
Lawrence Berkeley Laboratory, Berkeley,
California

2. Project No.: 84-ER-112

9. Purpose, Justification of Need for, and Scope of Project (continued)

directions to ensure that CAM basic research addresses America's long-range high-technology needs. The CAM affiliates, consisting of major research teams from industry and universities, will participate in CAM. The following cost estimates and mix among facilities may vary depending upon the research and development progress, but does represent the current plan.

This project will be constructed at the Lawrence Berkeley Laboratory which is non-Government owned property.

10. Details of Cost Estimate

	Item Cost	Total Cost
a. Engineering, design, inspection and administration	4,485	
b. Construction costs	23,864	
c. Standard equipment	6,120	
d. Removals and relocations	600	
e. Contingencies at approximately 15% of above	5,181	
Total estimated cost		$40,250

11. Method of Performance

Conventional facilities engineering design will be performed under a negotiated Architect/Engineer subcontract. Inspection and some engineering will be done by Laboratory personnel. Construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bids.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Center for Advanced Materials
Lawrence Berkeley Laboratory, Berkeley, California

2. Project No.: 84-ER-112

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project costs:						
1. Total facility costs [a]						
(a) Construction line item						
SSCL..............................	$ 437	$ 1,022	$ 6,212	$ 4,279	$ 0	$11,950
AML...............................	0	420	3,962	13,243	10,675	28,300
	437	1,442	10,174	17,522	10,675	40,250
(b) PE&D..............................	8	192	0	0	0	200
Total project costs........................	445	1,634	10,174	17,522	$10,675	$40,450
	FY 1984	**FY 1985**	**FY 1986**	**FY 1987**	**FY 1988**	**FY 1989**
b. Other related funding requirements (estimated life of project: 25 years)						
1. Programmatic research.................	2,300	2,800	3,200	6,200	10,500	15,500
2. Capital equipment related to programmatic research...............	1,300	600	460	1,500	2,600	3,900
Total..	$ 3,600	$ 3,400	$ 3,660	$ 7,700	$13,100	$19,400

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[a] Includes escalation to midpoint of construction for all conventional facilities and compounded annually for special facilities; FY 1986 3.8%; FY 1987 $5.0%; FY 1988 5.8%.

1. Title and location of project: Center for Advanced Materials
Lawrence Berkeley Laboratory, Berkeley, California

2. Project No.: 84-ER-112

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding

(1) The major elements of the CAM facility have been described in Item 8. The funding profiles were determined as follows:

(a) Construction of the Surface Science and Catalysis Laboratory began in April 1985 and will be completed in the second quarter of FY 1987.

(b) The Advanced Materials Laboratory building is scheduled for Title I review in the second quarter of FY 1986. The project will be scheduled to sequence bid packages to minimize disruption to existing programs and construction congestion and to optimize favorable bidding conditions and work leveling. Site bid packages will be let in the third quarter of FY 1986. Building construction will begin in the first quarter of FY 1987 and end in the fourth quarter of FY 1988.

b. Other related funding requirements

The annual costs of the scientific program are increased progressively to build up a high quality research staff for the CAM laboratories. Funding in the early years of the project is mainly to attract superior senior scientists to lead the new scientific programs described in Item 9. These researchers can be housed initially on the University campus and then in the SSCL Building until all conventional facilities are completed. The programs will expand in the latter years of the project to include the full complement of scientists and technicians. The capital equipment needs related to this research staff buildup reflect Laboratory experience that numerous laboratory equipment items will be needed at the level of approximately 20% of the operating program budget. These amounts were augmented in the first two years to take into account startup capital equipment needs.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
BASIC ENERGY SCIENCES
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Stanford Synchrotron Radiation Laboratory Enhancement
Stanford Linear Accelerator Center
Stanford, California

2. Project No.: 84-ER-113

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3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate: $12,833

6. Current cost estimate: $13,233
Less FY 1983/1984 PE&D: 400
$12,833

Date: January 1986

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 1,240	$ 1,240	$ 1,240	$ 544
1985	7,413	7,413	7,413	2,661
1986	2,463	2,463	2,463	5,160
1987	1,717	1,717	1,717	4,468

8. Brief Physical Description of Project

The Stanford Synchrotron Radiation Laboratory (SSRL) Enhancement will be located at the Stanford Synchrotron Radiation Laboratory. SSRL is colocated with the Stanford Linear Accelerator Center (SLAC) on Stanford University property that has been leased to the Department of Energy.

The SSRL Enhancement project will include the construction of new conventional and research facilities and the alteration of and additions to existing facilities for the purpose of providing ultra-high brightness synchrotron radiation from insertion devices (wigglers and undulators).

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Stanford Synchrotron Radiation Laboratory Enhancement
Stanford Linear Accelerator Center
Stanford, California

2. Project No.: 84-ER-113

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8. Brief Physical Description of Project (continued)

The project is divided into three major portions: (a) construction of two beam lines, one on the SLAC Positron Electron Project (PEP) storage ring and an 18 degree beam line on the Spear storage ring; (b) alteration of the electron storage ring SPEAR for high flux synchrotron radiation research and (c) construction of three conventional facilities: two PEP Beam Line Facilities and a Laboratory/Office/Shop Building (LOS).

a. Beam lines

(1) PEP Beam Lines

The PEP electron-positron storage ring is operated by the Stanford Linear Accelerator Center for the study of elementary particle physics. In its present configuration it can be usefully operated from 8 GeV to 18 GeV, although the majority of the program has focussed upon research at 14 GeV. During the normal running of the machine, the electron and positron beams emit synchrotron radiation from within the bending magnets with photon energies in excess of 100 KeV.

This project also includes funding for installation of two 26-period, 2-meter rare earth cobalt undulator magnets on a symmetry straight section of the PEP storage ring, resulting in the emission of photon beams peaked at 13 KeV when the machine is running at 14 GeV. Mossbauer diffraction and ultra-high energy resolution x-ray scattering research will be performed on these beam lines.

(2) Eighteen Degree Beam Line

To complement the high x-ray energy program on the PEP storage ring, SSRL proposes to construct a low-energy photon beam on the SPEAR storage ring, on the reinforced mezzanine in Bldg. 131. SSRL would relocate the existing Seya-Namioka monochromator from Beam Line I, and construct a new beam line transport system, consisting of two successive focussing mirrors.

1. Title and location of project: Stanford Synchrotron Radiation Laboratory Enhancement
Stanford Linear Accelerator Center
Stanford, California

2. Project No.: 84-ER-113

8. Brief Physical Description of Project (continued)

b. Machine Improvements

(1) Reduction of SPEAR Emittance and Vertical Aperture Requirements

To obtain approximately an order of magnitude increase in spectral brilliance from all beam lines and to more effectively utilize insertion devices, the injection system and the electron optics of the storage ring will be modified. This will achieve a factor of approximately 3.5 reduction in horizontal emittance and a factor of approximately two reduction in vertical aperture requirements at wiggler and undulator locations.

To accomplish the proposed reduction in emittance, SSRL has initiated the design and fabrication of a current shunt for the four focussing magnets located between the injection kicker magnets, using FY 1983 R&D operations funds. SSRL will also complete the shunt and injector modifications, and modify the SPEAR sextupole powering system. At present, the SPEAR sextupole magnets are divided into two families, each of which is powered independently. To properly correct for chromaticity effects in low emittance configurations, the SPEAR sextupole magnets need to be divided into four independently powered families. This requires two additional power supplies and additional cabling.

Realization of the full benefits of the reduced emittance and reduced vertical aperture requirement requires an improved beam position monitoring system for the storage ring. Improved monitoring and control over the orbit will result in reduced cross-coupling and better steering of the SSRL synchrotron radiation beams.

In addition, modifications and additions will be made to the SPEAR lattice to facilitate compensation for the increased number of wiggler/undulator magnets that will be implemented in the future.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Stanford Synchrotron Radiation Laboratory
   Enhancement
   Stanford Linear Accelerator Center
   Stanford, California

2. Project No.: 84-ER-113

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8. Brief Physical Description of Project (continued)

(2) Beam Stabilization

At present the stored beam in SPEAR is perturbed by ground vibrations which couple into the SPEAR magnet supports, causing small amplitude, low frequency (4-12 Hz) oscillations of the electron beam. The effect of this is to cause vertical bouncing of the synchrotron radiation beams and intensity modulation of the flux transmitted through narrow slits at the experimental stations.

The present level of "beam bounce" will be reduced by making use of electronic feedback systems to detect and reduce the amplitude of the beam bounce by applying magnetic corrections to the orbit at each beam line source point.

(3) New Linac Electron Injection System

The American University proposal to construct a new electron gun and injection system will be funded in FY 1984. This gun is designed to produce high current, long pulse length (approximately 1 microsecond) beams of low energy electrons suitable for use in a nuclear physics research program.

SSRL funded the addition of a "chopper" to the gun in order for the injection system to have the capability for producing short pulses (of about 1 nanosecond in duration). This addition will allow the gun to provide low current beams, up to about 4 GeV, suitable for electron injection into SPEAR. A gun with this capability will be advantageous for use during SSRL dedicated operation of SPEAR since it can provide more reliable injection into SPEAR at somewhat lower operations costs It will also allow dedicated operation of SPEAR during parts of SLAC's summer shutdowns.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Stanford Synchrotron Radiation Laboratory Enhancement
Stanford Linear Accelerator Center
Stanford, California

2. Project No.: 84-ER-113

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8. Brief Physical Description of Project (continued)

c. Conventional Construction

(1) PEP Beam Line Facility 5B (PBF 5B)

The site at PEP has been chosen for the first PEP Beam Line and the associated facility. The site is just within the existing SLAC lease boundary and it will not be necessary to acquire more land from the University for the facility. The site requires a retaining wall for the access road, service yard and PBF building which will be half buried into the PEP ring earth shielding mount.

The PBF 5B will be an experimental hall with three adjoining rooms and a partial mezzanine. The hall and room areas will be 2,900 square feet; the mezzanine will be 600 square feet, for a total of 3,500 square feet.

(2) PEP Beam Line Facility 1B (PBF 1B)

The site at PEP has been chosen for the second PEP Beam Line and the associated facility. The site also requires a retaining wall for the access road, service yard and PBF building which will be three-fourths buried into the PEP ring earth shielding mount.

(3) Laboratory/Office/Shop Building (LOS)

The Laboratory/Office/Shop Building (LOS) will be a three-story, 31,500 gross square feet building designed to accommodate activities displaced by beam lines in the existing SSRL buildings, as well as laboratory growth associated with SEP and other SSRL construction programs.

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1. Title and location of project: Stanford Synchrotron Radiation Laboratory
Enhancement
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2. Project No.: 84-ER-113

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8. Brief Physical Description of Project (continued)

The first floor will consist of a Vacuum Clean Room, a Beam Line Component Assembly Shop, a Machine and Welding Shop, and machine shop offices and storage facilities.

The second floor will consist of six light laboratories, each 1800 gsf in size, with the following functions, respectively: 1) electronics, 2) computation, 3) biotechnology, 4) vacuum-ultraviolet research, 5) metrology and 6) x-ray research. Provision will be made for later addition of two chemical fume hoods and two toxic/acid waste disposal systems.

The third floor will provide up to 43 offices, a library, a conference room, a drafting room, a lounge-lecture area, and seven work rooms.

9. Purpose, Justification of Need for, and Scope of Project

Over the past decade, the development of synchrotron radiation has led to major advances in a number of different scientific and technological fields, but particularly materials science, condensed matter physics and chemistry, as well as the biological sciences. Each order of magnitude increase in photon flux or spectral brilliance achieved during this period has resulted in qualitatively new experiments which provide previously unobtained information and yield new understandings.

The most significant recent advances in photon flux and brilliance have been, or will be, the result of: (a) the development of insertion devices (wigglers and undulators) at SSRL and (b) improvements in storage ring characteristics (reduction of emittance and increases in current).

As a result, new storage rings are presently being planned which are optimized for high spectral brilliance and photon flux through utilization of insertion devices, rather than bending magnets, for the production of radiation

1. Title and location of project: Stanford Synchrotron Radiation Laboratory Enhancement
Stanford Linear Accelerator Center
Stanford, California

2. Project No.: 84-ER-113

9. Purpose, Justification of Need for, and Scope of Project (continued)

and through the achievement of extremely low emittances and high currents. These rings are also optimized for specific spectral regions through choice of stored electron energies. Generally, stored electron energies at 1.0 to 1.5 GeV are utilized for ultra-high brilliance soft x-ray and vacuum ultraviolet (VUV) generation whereas rings of greater than 3.0 GeV are used for ultra-high brilliance x-ray generation.

The SSRL improvements described here will rapidly and economically yield major increases in the photon flux and spectral brilliance available at SSRL in all spectral ranges. In addition, x-ray spectral brilliance far beyond those achieved or proposed elsewhere in the world will be obtained. The SSRL construction will also increase the time available for dedicated synchrotron radiation operation of the storage ring SPEAR and increase the effectiveness of utilization of the radiation. At the same time, it will provide for testing and development of individual insertion devices as well as the techniques for utilizing many insertion devices on one storage ring.

The existing Stanford Synchrotron Radiation Laboratory has outstanding user facilities that can be dramatically and quickly improved in the hard x-ray region, thereby providing researchers with unparalleled photon brightness over an extended portion of the electromagnetic spectrum. A past 100-fold improvement to SSRL intensity in the soft x-ray region involved the installation at SPEAR of a permanent magnet undulator conceived and built at LBL. A current LBL/SSRL collaboration will provide a 50-fold improvement over the entire energy range based on an LBL-developed wiggler. Therefore, it is logical to continue joint activities to further improve SSRL facilities as a cost-effective way of providing researchers with additional advanced tools to complement those available elsewhere.

This project will be constructed at the Stanford Linear Accelerator Center which is non-Government owned property.

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1. Title and location of project: Stanford Synchrotron Radiation Laboratory Enhancement
Stanford Linear Accelerator Center
Stanford, California

2. Project No.: 84-ER-113

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10. Details of Cost Estimate

	Item Cost	Total Cost
(a) Engineering, design, and inspection..................	1,899	
(b) Construction costs..................................	8,367	
(c) Standard equipment..................................	308	
(d) Removals and relocations............................	100	
(e) Contingencies at approximately 19% of above..........	2,159	
Total estimated costs..		$ 12,833

11. Method of Performance

The SSRL special facilities engineering design will be done by Laboratory (SSRL and SLAC) personnel, as will major technical component construction and assembly. Technical component construction and fabrication will be done by a combination of SLAC shops and by subcontracts awarded on the basis of competitive bidding and managed by SSRL and SLAC personnel.

Conventional facilities engineering design will be performed partially under a negotiated Architect/Engineer subcontract, but primarily by the SLAC Plant Engineering Dept. on a "best efforts" basis. Inspection and some engineering will be done by Laboratory personnel. Construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bids.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Stanford Synchrotron Radiation Laboratory Enhancement
Stanford Linear Accelerator Center
Stanford, California

2. Project No.: 84-ER-113

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12. Funding Schedule of Project Funding and Other Related Funding Requirements

	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total facility construction costs: [a]					
SSRL Enhancement	$ 544	$ 2,661	$ 5,160	$ 4,468	$ 12,833
Total facility construction cost..........	544	2,661	5,160	4,468	12,833
b. Other project funding:					
SSRL R&D................................	800	800	0	300	1,900
Total R&D/Startup........................	800	800	0	300	1,900
Total Project Funding........................	$ 1,344	$ 3,461	$ 5,160	$ 4,468	$ 14,733

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Related Funding Requirements

a. Total Project Funding

(1) The major elements of the SSRL Enhancement Project have been described in item 8.

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[a] Includes escalation to midpoint of construction for all conventional facilities and compounded annually for special facilities; FY 1984 N/A; FY 1985 6.2%; and FY 1986 $6.5%.

1. Title and location of project: Stanford Synchrotron Radiation Laboratory Enhancement
Stanford Linear Accelerator Center
Stanford, California

2. Project No.: 84-ER-113

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (continued)

The funding profiles were determined as follows:

(a) At SSRL the PEP Beam Line will be accomplished during the first two years. Improvements to SPEAR are scheduled for the second year and the Laboratory/Office/Shop Building is scheduled for the second and third year. Completion of the PEP Beam Line Facility 1B will occur in the third year, and completion of the PEP Beam Line 1B will occur in the fourth year.

(2) Other project funding

(a) Insertion Devices and Beam Line Optical Elements R&D activities include in-vacuum undulators, and advance beam line components suitable for ultra high brilliance photon beams.

(b) SSRL R&D is related in support of the construction project includes prototype development and R&D on technical components.

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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
BASIC ENERGY SCIENCES
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Kansas State University, Ion Collision Physics Facility, Manhattan, Kansas

2. Project No.: 85-ER-403

3. Date A-E work initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 2nd Qtr. FY 1985

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: $3,400

6. Current cost estimate: $5,028

Date: January 1986

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$ 2,000	$ 2,000	$ 2,000	$ 100
1986	1,828	1,828	1,828	928
1987	1,200	1,200	1,200	2,100
1988	0	0	0	1,900

Financial schedule is based on the net Government funding associated with this project. In May 1985, the State of Kansas Legislature appropriated $1,100,000 for the conventional construction necessary to house the new capabilities.

8. Brief Physical Description of Project

The James R. MacDonald Laboratory will be expanded to house a new booster accelerator and a new low energy highly charged ion source. A 9,000 square foot basement addition will be required to house these facilities. The additional power requirement is 100 KVW. Very little additional water for cooling will be required.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Kansas State University, Ion Collision Physics Facility, Manhattan, Kansas

2. Project No.: 85-ER-403

8. Brief Physical Description of Project (continued)

New equipment to be installed in new basement addition includes:

A. Cryogenic ion source including electron gun, superconducting solenoid magnet. Analyzing magnet, accelerating column and beam line apparatus.

B. Superconducting linear accelerator includes resonators, amplifiers, power supplies, RF control system, superconducting solenoids, liquid nitrogen system, liquid helium refrigerator and storage dewar, accelerator control computer system, data acquisition and data reduction computer system.

9. Purpose, Justification of Need for, and Scope of Project

The construction of the ion collision physics facility, together with the existing atomic physics capability at Kansas State University, will constitute the Institute for Atomic Collision Physics. The project will involve construction and installation of (1) an advanced source of low energy highly charged ions of the CRYEBIS type and (2) a LINAC booster comprising twelve superconducting split-ring resonators. Each of these two additions will function as an adjunct to the existing tandem Van de Graaff in ways that, along with a dedicated system for high speed computation and data analysis, will have the capability to study the atomic physics of a spectrum of ions, energies and intensities unmatched in the world. This will open new areas of atomic collision physics, allow long beam time experiments, and provide a forefront environment for training young scientists and encouraging interdisciplinary cross-fertilization.

This project will be constructed on the Kansas State University campus, non-Government owned property.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Kansas State University, Ion Collision Physics Facility, Manhattan, Kansas

2. Project No.: 85-ER-403

10. **Details of Cost Estimate**

	Item Cost	Total Cost
a. Engineering, design and installation		$ 980
b. Land and level rights		0
c. Construction costs		330
1) beam line construction	$ 315	
2) utilities	15	
3) buildings	a/	
d. Equipment		2,900
e. Contingency		818
Total Project Cost		$ 5,028 a/

11. **Method of Performance**

This type of construction is unique and therefore the conceptual design, final design, assembly, and testing will be done by the staff of Kansas State University. Component parts equipment and building construction will to the extent possible be based on fixed priced competitively obtained procurement actions.

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a/ Kansas State University has provided additional funding to construct the building. Estimate is based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Kansas State University, Ion Collision Physics Facility, Manhattan, Kansas

2. Project No.: 85-ER-403

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project funding					
(1) Total facility costs					
(a) Construction line item....................	$ 100	$ 928	$ 2,100	$ 1,900	$ 5,028 a/
(b) CP&D....................................	0	0	0	0	0
(c) Expense funded equipment..................	0	0	0	0	0
(d) Inventories...............................	0	0	0	0	0
Total facility costs......................	$ 100	$ 928	$ 2,100	$ 1,900	$ 5,028 a/
(2) Other project funding					
(a) R&D necessary to complete construction....	$ 180	$ 180	$ 50	$ 0	$ 410
(b) Other.....................................	0	0	0	0	0
Total other project funding...............	180	180	50	0	410
Total project funding.....................	$ 280	$ 1,108	$ 2,150	$ 1,900	$ 5,438 b/

b. Related annual funding requirements (estimated life of project: 20 years)

(1) Operating costs..	$ 0
(2) Programmatic operating expenses..	600
(3) Capital equipment not related to construction but related to the programmatic effort in the facility....................................	50
(4) GPP or other construction related to programmatic effort in the facility...	0
(5) Other costs..	0
Total..	$ 650

13. Narrative Explanation of Total Project Funding and Other Related Requirements

No narrative required.

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a/ Kansas State University has provided additional funding to construct the building. Estimate is based on completed conceptual design.

b/ As noted above, the State of Kansas has provided an additional $1,100,000 for conventional construction of housing.

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1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
BASIC ENERGY SCIENCES
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects

2. Project No.: 87-R-400

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 2nd Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: None
Date:

6. Current cost estimate: $4,080
Date: January 1986

7. Financial Schedule:

Fiscal Year	Obligations	Costs FY 1985	Costs FY 1986	Costs FY 1987	Costs After FY 1987
Prior Year Projects	$ 400	$ 167	$ 0	$ 0	$ 0
FY 1985 Projects	3,750	2,015	1,735	0	0
FY 1986 Projects	3,877	0	847	3,030	0
FY 1987 Projects	4,080	0	0	470	3,610

8. Brief Physical Description of Project

This project is required to provide for minor new construction, other capital alterations and additions, and for buildings and utility systems. Where applicable, the request also includes the cost of installed capital equipment integral to a subproject. Funding of this type is essential for maintaining the productivity and usefulness of Department-owned facilities. Since it is difficult to detail this type of project in advance, a continuing evaluation of requirements and priorities may be expected to result in additions, deletions, and changes in the currently planned subproject. In general, the estimated funding for each location is preliminary in nature, and is intended primarily to indicate the relative magnitude of the requirements. No significant R&D program is anticipated as a prerequisite for design and construction of the subprojects under construction.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: General plant projects 2. Project No.: 87-R-400

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8. Brief Physical Description of Project (continued)

The currently estimated distribution of FY 1986 funds by office is as follows:

Argonne National Laboratory	$ 3,000
Ames Laboratory	600
Notre Dame Radiation Laboratory	30
Sandia National Laboratories	300
Stanford Synchrotron Radiation Laboratory	150
Total project cost	$ 4,080

9. Purpose, Justification of Need for, and Scope of Project

The following are examples of the major items to be performed at the various locations. Since needs and priorities may change, other projects may be substituted for the examples listed below, and some of these may be located on non-Government owned property.

Argonne National Laboratory.. $ 3,000

1. Materials Handling Receiving/Shipping Building
2. Replace Post Indicator Valves
3. Install Standby Power Feed, ZPPR to Bldg. 752
4. RSWF Road Rebuilding
5. Rigging Test Facility Addition
6. Security System Upgrading
7. Upgrade Animal Facility Cooling E and Q Wings, Bldg. 202
8. Chiller and Unit Substation Replacement, Bldg. 205
9. 15kV Undergound Valut Switch Replacement, Bldg. 211
10. Transformer and Power Center Replacement, Bldg. 203
11. Replace Economizer Tubes of Boiler No. 5
12. Building 201 Improvements
13. Emergency Generator Replacement, Bldg. 350

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: General plant projects 2. Project No.: 87-R-400

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9. Purpose, Justification of Need for, and Scope of Project (continued)

14. Replace Air Compressors, Bldg. 211
15. Rehabilitate Washrooms and Locker Roomms, Bldgs. 301, 308 and 310
16. 15kV Underground Vault Switch Replacements, Bldg. 205
17. Upgrade of Electrical Service Laboratories, Bldg. 223
18. Cooling System Upgrade, Bldg. 203
19. Air Condition Hot Shop, Building 212
20. Lecture Room Improvement, Bldg. 221
21. Test Instrument Room for EBR-II Sodium Boiler Bldg.
22. Laboratory Renovation Lab, J-102, Bldg. 205
23. Upgrading of the Tandem-Linac Area, Phase IV, Bldg. 300
24. HFEF/S Backup Emergency Power Supply
25. Expansion of Instrument Test Facility (ITF) Bldg. 772

Of the total request of $3,000,000 for GPP at the Argonne National Laboratory approximately 50 percent will be used for plant rehabilitation and approximately 50 percent will be used for upgrading and programmatic projects.

At present, a total documented GPP backlog of approximately $20,000,000 exists at ANL for required upgrading and programmatic projects at both sites. This backlog is not static and is constantly under review by ANL management so that the most critical requirements are taken care of as promptly as possible with available GPP funding. These requirements may come about as the result of the unscheduled failure of major plant components or the need to satisfy scientific program requirements.

The backlog of GPP projects has tended to increase steadily in recent years due to the shortfall in funding line item requests for plant rehabilitation at ANL-East and ANL-West, and because of programmatic shifts at ANL which have required modifications to the existing plant. When it is considered that total GPP funds available to ANL in FY 1983 and FY 1984 total only $2,100,000, it is readily apparent that while funding was increased ANL needs still far outpace the availability of funds with which to satisfy them.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects 2. Project No.: 87-R-400

9. Purpose, Justification of Need for, and Scope of Project (continued)

Ames Laboratory.. $ 600

Requirements include for example: development building second floor addition, campus warehouse roof replacement, metallurgy building electrical system upgrade, water system upgrade and miscellaneous proejcts. The projects described will be constructed on the Ames Laboratory, non-Government owned property.

Notre Dame Radiation Laboratory.. $ 30

Requirements include minor building modifications to properly house staff members and to make optimum use of laboratory research space. The projects described will be constructed on the Notre Dame Radiation Laboratory, non-Government owned property.

Sandia National Laboratories... $ 300

The Combustion Research Facility (CRF) at Sandia National Laboratories, Livermore (SNLL) has a continuing need for General Plant Project (GPP) funds for upgrading or the construction of facilities as required to meet expanding or changing programmatic goals.

Many experiments, both active and proposed, at the CRF have greatly impacted the available laboratory space and facilities. Some experiments have become increasingly complex and consequently require larger laboratory space than is currently available to them. The GPP funding in this request will provide additional laboratory space with appropriate modifications to suit individual experimental situations.

Stanford Synchrotron Radiation Laboratory.. $ 150

Requirements include minor modifications and additions necessary to support the optimum use of the laboratory research space. Examples include cable trays, terminal racks, status panels, and similar improvements.

10. Details of Cost Estimate

See description, item 8. The estimated costs are preliminary and, in general indicate the magnitude of each program. These costs included engineering, design, construction and inspection.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects 2. Project No.: 87-R-400

II. Method of Performance

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by firm fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
BASIC ENERGY SCIENCES

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Accelerator and reactor improvements and modifications, various locations

2. Project No.: 87-R-401

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3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 1st Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: None
Less amount for CP&D: None
Net cost estimate: None
Date: January 1986

6. Current cost estimate: $2,883
Less amount for CP&D: 0
Net cost estimate: $2,883

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 2,883	$ 2,883	$ 2,883	$ 1,000
1988	0	0	0	1,333
1989	0	0	0	550

8. Brief Physical Description of Project

This project provides for additions and modifications to accelerator and reactor facilities, which are supported by the Basic Energy Sciences program. Since program priorities and needs change, the projects described below indicate the most likely projects to be funded. A continuing evaluation, however, is necessary to ensure that those projects with the greatest productivity are funded. Two projects at the Brookhaven National Laboratory are requested to incorporate improvements at the High Flux Beam Reactor and the National Synchrotron Light Source; two projects are requested at the Oak Ridge National Laboratory for improvements at the High Flux Isotope Reactor and the Holifield Ion Research Facility, and one project is requested for an enhanced injection system at the Stanford Synchrotron Radiation Laboratory.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator and reactor improvements and modifications, various locations

2. Project No.: 87-R-401

9. Purpose, Justification of Need for, and Scope of Project

The following are the projected items of work to be performed at the various locations. Since needs and priorities may change, other projects may be substituted for the examples listed below, and some of these may be located on non-Government owned property.

Brookhaven National Laboratory

High Flux Beam Reactor Facility (HFBR).. $ 940

The control room recorders are becoming obsolete. Increased maintenance and unavailability of spare parts for the present system are two factors which contribute to the need for updated recorders. The control room recorders will be replaced with modern recorders which will reduce maintenance requirements, provide better timing accuracy and have capability for both analog and digital output.

The existing fuel element cutting system requires continual maintenance which results in unnecessary radiation exposure, inefficient use of maintenance personnel, and a system of less than desirable operating efficiency. A new system will be designed to eliminate the deficiencies of the present system and provide a simple and effective method of cutting spent fuel elements in the fuel storage canal.

An automated method of treatment will be installed for controlling biological fouling in the secondary system for the HFBR reactor.

The present HFBR turbines are not optimized to the existing workload conditions of helium pressure and mass flow. New turbines of appropriate design will improve the efficiency of the refrigerator, reduce power consumption and lengthen the expected life of the system components.

There is a need for a second compressor at the Cold Neutron Facility (CNF) in order to provide redundancy and assure continuity of operation. If the present compressor has to be removed from service for any reason, the

1. Title and location of project: Accelerator and reactor improvements and modifications, various locations

2. Project No.: 87-R-401

9. Purpose, Justification of Need for, and Scope of Project (continued)

facility must be shut down, with the attendant loss to the solid state physics and biology programs. The new compressor would not need to be as large as the old compressor (400 hp instead of 600 hp) since the loads are not as great as originally expected; this would result in some savings in electrical power consumption. A small building with a concrete mounting pad is included to house the new compressor.

Human error has been a factor in venting and purging of the CNF causing down time and programmatic delays. Improvements to the CNF console would include changing the layouts, making displays more compact and legible, and adding a computer to log operating procedures, thereby reducing downtime.

Instrumentation, equipment, and other reactor modifications are required for safeguards and security directly related to HFBR for protection against theft, radiation leakage, or sabotage of nuclear fuel storage and transfer.

National Synchrotron Light Source (NSLS).. $ 1,515

The linear accelerator preinjector will be replaced by a new state-of-the-art injector of higher performance, higher energy, and better reliability and maintainability.

The system of hardware which connects the control compiler system to hardware devices such as power supplies, beam diagnostic equipment, and safety interlocks, will be replaced with up-to-date equipment.

In addition to the 50 MHz rf system, the VUV ring rf system will be complimented with a 500 MHz rf system for making fractional nanosecond duration bunch lengths such as are desired in various experiments.

The pulsing power supplies of the booster synchrotron will be replaced with new units of improved stability and capable of operating at higher repetition rates.

1. Title and location of project: Accelerator and reactor improvements and modifications, various locations

2. Project No.: 87-R-401

9. Purpose, Justification of Need for, and Scope of Project (continued)

Oak Ridge National Laboratory

Holifield Heavy Ion Research Facility (HHIRF)... $ 300

The atomic physics program at ORNL supports the national effort in basic atomic collisions research and its application to energy technology. This project is designed to increase the utility of the Holifield Heavy Ion Research Facility (HHIRF) for atomic physics and is part of a continuing program to provide for those improvement which have been identified as having the highest priority.

Experiments conducted in the ORNL EN-tandem require extension to the higher energies available from the HHIRF facility. The wide energy overlap available between these two accelerators, plus the fact that the EN accelerator reaches to energies much lower than those attainable with the HHIRF accelerators, provide a highly flexible accelerator complex. The experimental apparatus proposed here will enable us to exploit the unique capabilities of this accelerator complex. The experimental apparatus proposed here will enable us to exploit the unique capabilities of this accelerator complex.

Ames Laboratory
Ames Research Reactor.. $ 128

Provides funds for modifications to the Ames Research Reactor, which will make this space usable for laboratory research.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator and reactor improvements and modifications, various locations

2. Project No.: 87-R-401

9. Purpose, Justification of Need for, and Scope of Project (continued)

10. Details of Cost Estimate

a. High Flux Beam Reactor Facility	$ 940
b. National Synchrotron Light Source	1,515
c. Holifield Heavy Ion Research Facility	300
d. Ames Research Reactor	128
Total Project Cost	$ 2,883

11. Method of Performance

Design, engineering, and inspection will be performed by laboratory staff. To the extent feasible, construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
BASIC ENERGY SCIENCES

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Neutron scattering experimental hall, Los Alamos Neutron Scattering Center (LANSCE) Los Alamos, New Mexico

2. Project No.: 87-R-403

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3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 1st Qtr. FY 1987

4. Date construction ends: 2nd Qtr. FY 1989

5. Previous cost estimate: None
Date: None

6. Current cost estimate: $ 17,500
Date: January 1986

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	a/	a/	a/	a/
1987	$ 5,000	$ 5,000	$ 5,000	$ 4,600
1988	8,500	8,500	8,500	7,900
1989	4,000	4,000	4,000	5,000

8. Brief Physical Description of Project

This project provides for the addition of an experimental hall, support space, and associated facilities to the Los Alamos Neutron Scattering Center (LANSCE) to allow full use of what will be the nation's most intense pulsed neutron source with the completion of the Proton Storage Ring (PSR). The unique vertical orientation of the proton beam as it strikes the neutron-generating target allows neutron drift tubes to be arranged in a full 360° circle permitting experiments to be arranged in all directions around the source. The proposed experimental hall will provide the additional space required to fully utilize this powerful source for a national neutron scattering program at LANSCE.

a/ Funding in the amount of $1,000,000 was appropriated by the Congress in FY 1986 in the Atomic Energy Defense Appropriation with instructions that future Appropriations were to be requested in the Energy Supply Appropriations.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Neutron scattering experimental hall,
Los Alamos Neutron Scattering Center (LANSCE)
Los Alamos, New Mexico

2. Project No.: 87-R-403

8. Brief Physical Description of Project (continued)

The experimental hall will be an 18,000 square foot pre-engineered high-bay structure on a concrete slab attached to the east side of the LANSCE facility. This structure will house a minimum of nine experiments on nine flight paths. Two of the flight paths can be extended as far as 300 meters outside the hall for ultra-high resolution experiments. An overhead crane with a 20 foot hook height will provide access to both the experiments and the service area. The hall will be equipped with a full complement of services required for multiuse experiments, including special grounds, extension signal cable, easy access to several power distribution systems, process cooling water, compressed air, and inert gas distribution systems. An access channel into the existing LANSCE experimental area suitable for forklift trucks will be provided.

Ventilation and heating for the experimental hall will be a recirculating forced-air system with heat provided by the existing hot water service. Plumbing and piping system will consist of gas, potable hot and cold water, industrial water, sanitary sewer, contaminated liquid waste drain, cooling tower water, and compressed air. Fire protection will be provided through a wet-pipe sprinkler system and alarms. Existing site utility systems, except for the sewage system, have adequate capacity.

An approximate 22,800 square foot three-story building directly attached to the hall will also be constructed. This building will house the new data acquisition system, mechanical and electronic shops, sample preparation laboratories, cryogenic laboratories, and offices for users and personnel directly associated with the operation of the user program at the LANSCE.

Only minimal site preparation will be required for the experimental hall after an existing detector building is relocated. The site will be essentially clear and at the same elevation as the existing LANSCE experimental area. A new 1500-kVA substation and an increase in sewage treatment capacity at the existing lagoons will be required. The present hall will be renovated by adding two new access doors, by installing a catwalk system, and by drilling five new shielding penetrations for new neutron beamlines. Special facilities for nuclear physics studies will be removed from the existing experimental hall and reestablished elsewhere to provide more space and independent operation for the neutron scattering programs.

1. Title and location of project: Neutron scattering experimental hall,
Los Alamos Neutron Scattering Center (LANSCE)
Los Alamos, New Mexico

2. Project No.: 87-R-403

8. Brief Physical Description of Project (continued)

The project includes funding for construction of four new spectrometers specially designed to make optimum use of the intense pulsed neutron beam. These will be in addition to six world class spectrometers, built and tested at LANSCE prior to construction of this experimental hall, that will be installed in the new experimental hall. Present plans include one spectrometer for each beam hole, although as many as two per beam hole are often feasible. In addition to the ten spectrometers discussed above, new spectrometer development and other experiments will be conducted on five other beam lines. Altogether, the neutron scattering program will have fifteen beam lines available when full facility operation is reached - ten operating world class spectrometers along with five other beam lines for future spectrometer locations.

The project also includes funding for six data collection computers of advanced design and a hub computer for data reduction, storage and manipulation. Time-of-flight experiments with the PSR are expected to collect an enormous amount of data (approximately 1 million resolution elements per instrument) at very high instantaneous data rates (up to 20 MHz expected). On-line data reduction will be essential so that raw data can be transformed into physical terms, displayed with high-quality graphics, thereby allowing on-line decisions on the progress of the experiments. Peak data rates with the PSR will be 400 times current levels and time average data rates will be 40 times current levels. We will continue to use four of the computers now in service so that ten experiments can run simultaneously with independent data collection systems when the facility is complete. These four existing computers will be replaced gradually after FY 1986 with advanced systems incorporating the latest in computer improvements. Funds for these four replacement computers be provided in later years.

9. Purpose, Justification of Need for, and Scope of Project

The LANSCE facility, which is now in operation, is a neutron time-of-flight laboratory devoted to neutron scattering research in materials science and neutron nuclear science research. The research is applied to problems of significance to the nation's energy and defense programs and also contributes to the pool of basic knowledge underlying materials and nuclear science. The experimental program, which is well underway using the existing LANSCE spallation source, covers a wide variety of condensed matter research. The program also includes research into improved

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Neutron scattering experimental hall,
Los Alamos Neutron Scattering Center (LANSCE)
Los Alamos, New Mexico

2. Project No.: 87-R-403

9. Purpose, Justification of Need for, and Scope of Project (continued)

spectrometers and neutron source design that will allow the optimum use of pulsed neutrons. This research program has been planned so that it can continue and can grow throughout the period of construction of the PSR and the proposed experimental hall. The original plan for the existing experimental hall did not contemplate the 100 fold increase in neutron source capability to be made available by the PSR. This greater intensity and optimized pulse structure from the PSR transformed the source into clearly the best spallation neutron source in the nation and perhaps in the world. The extraordinary capabilities have proved attractive not only to the Los Alamos National Laboratory staff, but to a large contingent of the nation's best researchers from universities and from industry. The increasing flow of visiting experimenters is being organized into a user group that began operation formally in May 1983. Proposals for experiments at Los Alamos from this user group are submitted to an external panel of reviewers. These external reviewers will plan the use of 2/3 of the beam time available on the established spectrometers. Presently, the reviewers receive requests for three times as much experimental time as the facility can provide. Soon after the PSR becomes operational, the Laboratory expects to host approximately 100 visitors each year.

The requested experimental hall will provide adequate experimental areas to accommodate the user community and will permit the full use of the neutron source for material science research. Space is included ultimately for as many as 15 spectrometers with enough room between so that neighboring experiments do not interfere with each other. It includes space located at longer distances from the source that permits full exploitation of advances in resolution made possible by the source. Room for staging of experiments and for preparation of samples in special environments is included within the experimental hall. Also, the hall is provided with an overhead crane that allows equipment to be transported over all of the experimental and staging areas. Sound conditioned or "quiet" rooms are located adjacent to the experimental floor for the use of experimenters in evaluating and planning the next step in an active experiment.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Neutron scattering experimental hall,
Los Alamos Neutron Scattering Center (LANSCE)
Los Alamos, New Mexico

2. Project No.: 87-R-403

9. Purpose, Justification of Need for, and Scope of Project (continued)

Since data collection rates for many experiments at LANSCE will be orders of magnitude greater than encountered at present facilities, it is necessary that at least half of our spectrometers have forefront computerized data collection and analysis systems when the PSR becomes operational. This system will make possible the operation of experiments at full performance levels and also will greatly speed the interpretation of the results of the experiments. State-of-the-art data collection and handling facilities are of great importance to visiting scientists who must complete experiments and interpret them during very short visits probably lasting on the average of about one week. These computers will therefore ensure that the LANSCE facility will have its greatest impact in strengthening the national position in materials science through the visitor program. Data acquisition for other spectrometers designed for slower data rates (small samples, ultra-high resolution) will use computers now in service at the LANSCE and will be replaced out of the annual Laboratory equipment budget allocation in accordance with the needs and funding level of the developing LANSCE program.

In summary, the combined floor space of the existing and proposed experimental hall of 22,500 square feet will more than quadruple the space available for spectrometers and staging of experiments thus assuring full use of the source intensity for the national neutron scattering program. The support area will provide space for data collection, light technician service, and for visiting users and facility support staff. The six data collection systems will assure that adequate computer facilities will be available to service at least five spectrometers simultaneously at the extraordinarily high data rates needed for the higher intensity neutron scattering measurements. This additional experimental and support space is essential in order for the nation's materials science research community to take full advantage of the major advance in pulsed neutron intensity provided by the PSR.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Neutron scattering experimental hall,
Los Alamos Neutron Scattering Center (LANSCE)
Los Alamos, New Mexico

2. Project No.: 87-R-403

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10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering, design, inspection** and project management.......		$ 1,450
1. Facility @ 11% of construction costs less Item B.3.........	$ 1,200	
2. Special equipment design at about 5% of Item B.3...........	250	
b. Construction costs..		12,950
1. Improvements to land......................................		
a. Site work including sand and filters..................	640	
2. Buildings		
a. East side laboratory and support offices, 22,800 sq. ft. @ $105/sq. ft..........................	2,400	
b. East experimental hall, 18,000 sq. ft. @ $168/sq. ft...	3,020	
c. Modify existing LANSCE experimental areas..............	2,080	
d. Relocate existing detector building....................	80	
3. Special equipment		
a. Computers...	1,750	
b. Spectrometers...	2,210	
4. Utilities including new substation........................	770	
c. Standard equipment including overhead cranes..................		500
Subtotal..............................		14,900
d. Contingency @ 18%..		2,600
Total estimated costs..................		$ 17,500

*The above cost estimate is based on a conceptual design that is complete. The Laboratory is using escalation rates of 4.9% for CY 1985, 6.4% for CY 1986, 6.7% for CY 1987 and 6.5% for 1988. These rates were provided by the "Data Resources Incorporated," under contract to the DOE.

**Engineering, design and inspection are projected from historical records and experience, then applied based on the complexity of the project.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Neutron scattering experimental hall,
Los Alamos Neutron Scattering Center (LANSCE)
Los Alamos, New Mexico

2. Project No.: 87-R-403

11. Method of Performance

Design and inspection of the facility additions will be accomplished by a negotiated architect-engineer contract. Special facility equipment design and procurement will be performed by the operating contractor. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and contracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project funding					
1. Total facility costs					
a. Construction line item	$ 0	$ 4,600	$ 7,900	$ 5,000	$ 17,500
b. PE&D	0	0	0	0	0
c. Expense funded equipment	0	0	0	0	0
d. Inventories	0	0	0	0	0
Total facility costs	0	4,600	7,900	5,000	17,500
2. Other project funding					
a. Conceptual design	180	0	0	0	180
b. Other project-related costs	2,420	0	0	0	2,420
Total other project funding	2,600	0	0	0	2,600
Total project funding (Items 1 and 2)	$ 2,600	$ 4,600	$ 7,900	$ 5,000	$ 20,100

b. Related annual funding requirements (estimated life of project: 25 years)

1. Experimental hall operating costs	$ 600
2. Programmatic research expenses directly related to the DOE/BES neutron scattering program	5,400
3. Capital equipment not related to construction but related to the programmatic effort in the facility	500
4. GPP or other construction related to programmatic effort in the facility	0
5. Other Los Alamos program costs	4,100
Total	$ 10,600

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Neutron scattering experimental hall,
Los Alamos Neutron Scattering Center (LANSCE)
Los Alamos, New Mexico

2. Project No.: 87-R-403

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13. Narrative Explanation of Total Project Funding and Other Related Requirements

a. Total project funding
   1. Total facility
      a. Construction line item. No narrative required.
      b. No PE&D is anticipated.
      c. No expense-funded equipment is anticipated.
      d. No inventories are anticipated.
   2. Other project funding
      a. The amount shown is for conceptual design. No research and development is necessary for this project.
      b. Other projected-related costs. Six world class spectrometers will be built and tested prior to experimental halls construction and will become part of the facility upon completion of construction.

b. Total related funding requirements
   1. Experimental hall operating costs
      This category includes maintenance, janitorial, and utilities calculated from FY 1984 costs on a per square foot basis throughout the Laboratory and projected to FY 1989. Approximately $600,000 per year is anticipated.
   2. Programmatic operating and research expenses directly related to the BES neutron scattering program is anticipated to be approximately $5,400,000 per year.
   3. Capital equipment not related to construction but related to the programmatic effort in the facility approximately $500,000 per year is anticipated.
   4. No GPP or other construction related to programmatic effort is anticipated.
   5. Other Los Alamos programs
      The Los Alamos National Laboratory will conduct internally-supported programs in neutron scattering and other research at an annual cost of $4,100,000.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
BASIC ENERGY SCIENCES

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: 1-2 GeV Synchrotron Radiation Source
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-406

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: [a]

4. Date construction ends: [a]

5. Previous cost estimate: None

6. Current cost estimate: $ 1,500[a]

Date: January 1986

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	1,500	1,500	1,500	1,500

8. Brief Physical Description of Project

The 1-2 GeV Synchrotron will be built within the Lawrence Berkeley Laboratory, which is located on University of California property adjacent to the Berkeley campus. The FY 1987 request is for A-E and long lead procurement to better define the cost, schedule and design prior to construction. (The estimated construction costs of the facility are projected at 90-100 million dollars with total R&D and startup costs of $25-30M.) The project will include the construction of new facilities, and alterations and additions to existing plant and site facilities, especially Building 6 (the circular building that now houses the 184-Inch Cyclotron). The 1-2 GeV Synchrotron is a special facility comprised of an electron storage ring and injection system, insertion devices (undulators and wigglers) for generating synchrotron radiation and photon beamlines. The facility consists of a 50-MeV injector, a full-energy booster synchrotron, an electron storage ring, which has 12 6-m-long straight sections for insertion devices, an initial complement of 5 insertion devices, and photon beamlines extending from the insertion devices. Development of 7 straight sections and 24 bending magnet ports are not included in the scope of this project. Their development in future years, however, will provide flexibility to respond to new scientific directions and to take advantage of new materials, designs, and other technological advances. When fully developed, the facility will be able to provide up to 60 user stations.

[a] The FY 1987 request provides for architect-engineering work and long lead procurement. The total estimated cost and exact construction dates of this project are currently under review.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: 1-2 GeV Synchrotron Radiation Source
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-406

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9. Purpose, Justification of Need for, and Scope of Project

The 1-2 GeV Synchrotron Facility will be a dedicated synchrotron radiation source that is optimized for generating vacuum ultraviolet and soft x-ray (XUV) light from periodic magnetic devices. Investigators from industry, universities, and national laboratories will have access to unique capabilities--high spectral brilliance and very short pulse length (nominally tens of picoseconds). Multi-period undulators in the storage ring will provide spatially and longitudinally coherent radiation that is broadly tunable across the XUV region of the spectrum.

The 1-2 GeV Synchrotron will permit new studies in both basic and applied science. In **biology**, for example, the high photon flux combined with the capability for wavelength tuning, will enhance imaging and scattering techniques. Picosecond pulses and the ability to match soft x-rays to the absorption features of major structural biological elements, such as carbon, nitrogen, and oxygen, will make it possible to undertake dynamical response studies of specimens in something very close to their natural state. The coherence properties of undulator radiation will extend the use of synchrotron radiation into the phase-sensitive world of x-ray interferometry and biological microholography.

In **atomic** and **molecular physics**, very high photon fluxes are needed for spectroscopic studies of free atoms and molecules in the gas phase; with radiation from undulators and wigglers an acceptable signal-to-noise ratio can be obtained for many experiments in the x-ray region. The facility will introduce new standards for spectral resolution, and will provide access to new studies of atomic structure and dynamics, quantum interference effects, and threshold phenomena.

In **chemistry**, the facility will open new areas of research on chemical reactivity. High spectral brilliance and picosecond time structure of the radiation will permit high-resolution dynamical studies of reaction kinetics, intramolecular transfer processes, excited state proton and electron transfer, and molecular photodissociation and photoionization.

In **materials** and **surface science**, the capabilities of the 1-2 GeV Synchrotron will permit new investigations of bulk materials as well as surfaces and interfaces. Time-resolved studies in catalysis will be possible with XUV radiation of extremely high brilliance and picosecond time structure. For instance, it will be possible to study the dynamics of surface contamination and interface formation and to verify microscopic models for catalysis, oxidation, corrosion, and interface growth.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
ENERGY RESEARCH ANALYSIS
Energy Supply Research and Development - Operating Expenses

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs. Base
Energy Research Analysis					
Operating Expenses..	$ 2,970 [a/]	$ 2,598	$ 2,598	$ 3,550	$+ 952

[a/] FY 1985 total does not include $30,000 transferred to the SBIR program.

Authorization: Section 209, P.L. 95-91.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Energy Research Analysis

(dollars in thousands)

FY 1986 Appropriation enacted	$2,700
FY 1986 Gramm-Rudman reduction	- 102
1986 adjusted	2,598
Program increases and decreases:	
- Increased funding for FY 1987 National Acid Rain Assessment	+550
- Increased funding for peer review	+402
1987 budget request	$3,550

The Energy Research Analysis (ERA) program budget request is $3,550,000 and provides DOE with the capability for independent, objective analysis of the Department's technical needs and opportunities. ERA fulfills the Director of Energy Research's responsibility "to monitor the Department's Energy R&D programs in order to advise the Secretary with respect to any undesirable duplication or gaps in such program," Section 209(b)(2), Public Law 95-91. In addition, funding and staff are required to support technical assessment and coordination needs within the sharply increased interagency research relating to acid rain.

Recent Accomplishments

o Assessments of Departmental research during FY 1985 and FY 1986 include the following:

  - Assessment of research needs in Surface Coal Gasification technology (University of California)

  - Other research needs (JASON)

  - Assessment of research needs in Heavy Ion Fusion (Lawrence Berkeley Laboratory and others).

o Program assessments, important for establishing research objectives, recently accomplished were:

  - Assessment of the Geothermal research and technology development projects in Solar Renewables programs.

o Acid precipitation research coordination and liaison responsibilities for DOE with other Federal agencies were supported by the Energy Research Analyses program and included the following specific efforts:

  - Preparation of the 1985 Assessment of the National Acid Precipitation Assessment Program (Oak Ridge National Laboratory, Brookhaven National Laboratory, et. al.).

  - Assessment of research needs in acid precipitation (Brookhaven National Laboratory, Oak Ridge National Laboratory, Pacific Northwest Laboratory, and Argonne National Laboratory).

FY 1987 objectives and associated budget levels are: (1) Performing independent analyses of DOE R&D programs to evaluate technical merit and future directions. One full program, depending upon the number of projects involved, can be analyzed within the Departmental Request ($400,000); (2) Performing independent assessments of technologies that may be contained within more than one program. Two or three technology assessments can be provided for within the Departmental Request ($500,000); (3) Support for Departmental research and coordination elements within the National Acid Precipitation Assessment Program (NAPAP), including $500,000 to support the Acid Deposition Assessment Staff and $150,000 to fund DOE's share of the Program Coordination Office support, and assessments leading to the 1987 NAPAP National Assessment ($700,000) for a total of $1,350,000; (4) Support of the assessments and advice provided by groups such as the Energy Research Advisory Board and JASON, to the Secretary, DOE ($1,000,000); and (5) Accomplishments assessments of R&D programs within Energy Research ($300,000).

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
UNIVERSITY RESEARCH SUPPORT
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
University Research Support (ER)					
Operating Expenses:					
University Laboratory Research					
University Laboratory Cooperative Research...	$ 6,500	$ 5,773	$ 5,773	$ 7,775	$+ 2,002
University Reactor Fuel Assistance.............	2,848	3,753	3,753	1,900	- 1,853
Subtotal......	$ 9,348	$ 9,526	$ 9,526	$ 9,675	$+ 149
Energy Manpower Development					
Energy Manpower Assessment.............	450	385	385	500	+ 115
Energy Education and Training................	300	385	385	800	+ 415
Subtotal......	$ 750	$ 770	$ 770	$ 1,300	+ 530
Total					
Operating Expenses......	$ 10,098	$ 10,296	$10,296	$10,975	$+ 679
University Research Support..............	$ 10,098[a][b]	$ 10,296[c]	$10,296	$10,975	$+ 679

Authorization: Section 209, P.L. 95-91, Section 31, Atomic Energy Act of 1954, Section 103 (103) P.L. 93-483.

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[a] FY 1985 total does not include $102,000 transferred to the SBIR program.

[b] Total reflects a reduction of $1,000,000 in FY 1985 for management initiatives savings.

[c] Total reduced by $404,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Act of 1985 (Gramm/Rudman/Hollings).

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: 1-2 GeV Synchrotron Radiation Source
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-406

9. Purpose, Justification of Need for, and Scope of Project (continued)

Industrial utilization of XUV radiation will be stimulated by the availability of this radiation source, which can become a focal point for industrial-academic collaboration. One industrial application of radiation from the 1-2 GeV Synchrotron is improved mask fabrication for the microelectronics industry. By utilizing the full potential of synchrotron radiation for x-ray lithography, it will be possible to achieve finer feature sizes at less demanding aspect ratios, while competitive writing speeds are maintained.

In the area of **national security**, scientists at several national defense laboratories have expressed the need for access to a modern soft x-ray synchrotron radiation facility like the 1-2 GeV Synchrotron. They have emphasized dependable access to high-flux, high-brilliance facilities for program-related research.

These scientific opportunities are only a sample, indicating the potential for state-of-the-art synchrotron radiation research with the 1-2 GeV Synchrotron. The proposed facility will provide a much-needed addition to this country's oversubscribed synchrotron radiation sources, and will provide important new opportunities for student research and training in an area in which a lack of qualified personnel is already being felt. These scientific and educational opportunities have been well documented recently by national committees studying major research facilities needed to keep the United States scientifically competitive. These committees have consistently given the 1-2 GeV Synchrotron high priority. They include the DOE's Planning Study for Advanced National Synchrotron Radiation Facilities, the NRC's Major Materials Facilities Committee, and the DOE's ERAB Materials Facilities ad hoc Review Committee which reviewed the NRC report.

The 1-2 GeV Synchrotron will be available to general users as well as to participating research teams (PRT's). The Laboratory is determined to construct a user-friendly facility and has arrangements for users to play a significant role in determining the specification and design of the beamlines. Before commencing construction, LBL will conduct one more Users' Workshop to finalize operational parameters and organize beamline user teams. In addition, the 1-2 GeV Synchrotron has 7 additional straight sections and 24 ports on bending magnets that will be available for development by PRT's or for future facility enhancement by LBL to enable users to take advantage of new scientific opportunities or unforeseen technological developments. Realization of the full capabilities inherent in the 1-2 GeV Synchrotron configuration would result in support of up to 60 user stations.

1. Title and location of project: 1-2 GeV Synchrotron Radiation Source
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-406

10. Detail of Cost Estimate

The project provides funds for an Architect-Engineer to accomplish design sufficient to define the cost, schedule, and scope of the proposed facility. Also included are funds necessary for long lead procurement for those components which would limit the timely completion of the project. Early studies have been completed and it is anticipated that the TEC will be $90,000,000 to $100,000,000.

11. Methods of Performance

Conventional facilities engineering design will be performed under a negotiated Architect/Engineer subcontract.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	FY 1987	Total
a. Total project costs		
1. A-E costs	$ 1,500	$ 1,500
Total facility costs	1,500	1,500
2. Other project costs		
(a) Storage Ring R&D	1,000	1,000
(b) Insertion Device and Beamline R&D	500	500
(c) Startup	0	0
(d) Capital Equipment Related to R&D	500	500
Total other project funding	2,000	2,000
Total project funding	$ 3,500	$ 3,500

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: 1-2 GeV Synchrotron Radiation Source
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-406

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

The FY 1987 funding request for the project is for A-E design and long lead procurement necessary to fully define the cost, schedule, and cost of the proposed facility.

Site preparation and building construction for the 1-2 GeV Synchrotron Facility is scheduled for FY 1988-1989, in order that the building be ready for installation of the injector and the storage ring. Fabrication of the beamlines and insertion devices is scheduled for FY 1988-1991.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer. (1)	General Reduction (2)	Management Initiatives (3)	Pay Cost Restoration (4)	FTE General Reduction (5)	Gramm-Rudman-Hollings (6)	ES&H Transfer/ Reprogramming (7)	Subtotal (8)	Comparability Adjustments (9)	Total (10)
Energy Research Analysis										
Operating Expenses	$ 2,700					$ -102		$ 2,598		$ 2,598
Subtotal, Energy Research Analysis	2,700					-102		2,598		2,598
General Reduction										
Management Initiatives										
Pay Restoration										
Use of Prior Year Balances (ERA)										
Use of Prior Year Balances (Other Energy Supply)										
Total, Energy Research Analysis	$ 2,700					$ -102		$ 2,598		$ 2,598

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
UNIVERSITY RESEARCH SUPPORT
(In thousands of dollars)

1986 Appropriation enacted	$ 10,700
1986 Gramm-Rudman reduction	- 404
1986 adjusted	$ 10,296
Program increases and decreases:	
o Increases the number of faculty and student research appointments at the DOE laboratories by 20% and increases support for laboratory/HBCU cooperative projects	+ 1,302
o Provides for Laboratory Technology Exchange including research support for visiting industrial scientist appointments	+ 700
o Provides for base reactor fuel program	- 1,853
o Increases support for high school science teacher/student research projects at DOE laboratories	+ 530
1987 Budget Request	$ 10,975

The principal goal of the University Research Support (URS) program is to help maintain strong scientific/technical research capabilities in support of the Department's long range energy R&D mission. This is accomplished through supporting specialized research and manpower development efforts which complement and underpin the R&D mission of other Departmental programs. The URS program provides a special Departmental focus for several efforts which primarily involve universities both directly or in conjunction with the Department's national laboratories and major contractors. The URS supported activities may be distinguished from other Departmental university R&D programs by their multidisciplinary nature and by their focus on manpower development needs. Individual efforts carried out through the URS program relate to one or more of the following mission objectives:

o Maintain and strengthen university-based energy research and manpower development efforts in selected high priority energy research fields.

o Utilize the unique resources of the national laboratories (equipment, instrumentation, and personnel) for university faculty and student research and training.

o Assist in the transfer of laboratory-developed technology and expertise to the private sector.

o Increase the number and enhance the quality of students, including women and minorities, pursuing professional-level degrees in energy-related science or engineering.

o Help strengthen the scientific/technical workforce in the Department's national laboratories.

There are two major subprograms within URS. The first subprogram, University Laboratory Research, is directed at strengthening the capabilities of both universities and national laboratories as major energy research performers in the conduct of long range energy research. Many of the specific activities supported within this subprogram rely on the use of facilities at the DOE Laboratories for faculty and student research training. This subprogram also includes support for implementing the Department's statutory responsibility for assessing the supply and demand of manpower for both current and projected energy R&D programs.

In order to carry out URS program objectives, a variety of approaches are used including faculty, graduate and undergraduate student research participation in national laboratory programs, joint efforts involving laboratory university scientists, and support for the operation of unique university-based nuclear research and training reactors.

In FY 1986, the following major accomplishments are planned for the URS program.

o Support 2,000 faculty and student research and training appointments at the DOE laboratories. Support five to eight visiting industrial scientist research appointments at the DOE laboratories.

o Refuel five to six university nuclear research reactors and support 20 university reactor sharing projects.

o Continue in-depth analyses of the supply/demand for manpower in energy R&D programs including publication of a comprehensive survey of manpower requirements in a number of energy R&D areas of direct relevance to the Department.

- Support one to two high school teacher/student workshops in energy-related science and mathematics at the DOE laboratories and 21 Pre-freshman Engineering Program projects reaching over 2,000 secondary school students.

The URS program also supports special research contracts in which costs are shared by the universities. The universities' contributions are provided by a number of mechanisms, e.g., salaries to investigators, summer student assignments, provision of facilities and/or equipment, etc. The URS program encourages such cost sharing policies to achieve maximum utilization of available Federal funds.

	FY 1985	FY 1986	FY 1987 Request
University Research Support..............	$10,098	$10,296	10,975

The FY 1987 request for the University Research Support Program is $10,975,000. Specific priorities at the requested level are as follows:

- Support 2,500 faculty/student research training appointments at the laboratories (including 1,250 undergraduates).
- Initiate new Laboratory Technology Exchange Program including continuing cost-shared support for up to 25 visiting industrial scientists at DOE laboratories.
- Refuel seven university research reactors and support twenty reactor sharing grants.
- Support four laboratory-based high school science teacher/student workshops.
- Support 2,300 junior high school minority and women participants in the Pre-freshman Engineering Program.

The following sections describe the proposed activities which will be carried out at the FY 1987 request level within each of the major URS subprograms.

University Laboratory Research...........	$ 9,328	$ 9,526	$ 9,675

There are two major emphases in this subprogram. The first is strengthening the capabilities of universities and the national laboratories to conduct long range energy related research and to help ensure an adequate scientific and engineering manpower base for both current and future energy R&D programs. The second emphasis is enhancing and expanding the transfer of laboratory-generated research and technology to the private sector.

	FY 1985	FY 1986	FY 1987 Request
University Laboratory Cooperative Research..............................	($ 6,474)	($ 5,773)	($ 7,775)

This activity includes a variety of approaches designed to bring the DOE laboratories, universities and industry into a closer partnership in meeting national priorities for energy research and manpower development. One of the principal objectives is to maintain the flow of manpower for future energy research programs by involving students in ongoing laboratory research programs. Additional research capabilities are also available to the Department's Laboratories through participating faculty. Funding is provided to ten multiprogram laboratories and university consortia (who work with other DOE contractors) for the placement of faculty, graduate, and undergraduate students in summer or academic year research activities.

The FY 1987 request includes support for the following:

- Undergraduate Student Research: Approximately 1,250 undergraduate science and engineering students will be supported in summer research assignments in the participating laboratories. Each student is assigned to an ongoing laboratory research program and is involved in energy related research significant to the Department's needs.

- Graduate Student Research: Graduate students who have completed their academic course work and are ready to undertake their thesis research are eligible for support under this program. About 250 graduate students in the sciences and engineering will collaborate with laboratory staff in areas of fundamental and applied research that are of interest to DOE.

- Faculty Research: About 300 faculty members from colleges and universities will participate in ongoing research at DOE laboratory and contractor sites. These appointments include both summer and academic year assignments. In a number of cases continued support is provided for on-campus research through funding provided directly by the laboratory's research programs and continued liaison with laboratory research staff.

- Special Energy R&D Training: Over 700 university faculty and students will participate in special energy-related workshops, short courses and institutes conducted at national laboratories on selected energy R&D topics and problem areas at the forefront of energy research. A sample of the workshops and institutes conducted within this activity are: Computer-Aided Spectroscopy, X-Ray Optics, Separation of Proteins by Two-Dimensional Electrophoresis, Measurement Techniques for Radium and Actinides, Overview of Advanced Energy Conversion Systems, etc. These workshops are important means by which state-of-the-art information on research and technology topics is disseminated to the university community.

- National Laboratory/Historically Black Colleges and Universities Programs: Continued support will be provided for cooperative research and manpower development programs between DOE laboratories and Black Colleges including ongoing efforts with Jackson State University/Lawrence Berkeley Laboratory and Atlanta University/Argonne National Laboratory.

- Laboratory Technology Exchange:

  As part of the Department's effort to expand the collaboration in research between the national laboratories and private industry, continued research support will be provided for visiting research appointments at DOE laboratories for industrial scientists. (This effort was budgeted in FY 1986 as part of the University-Laboratory Cooperative activity.) Participating laboratories identify research areas of potential interest to industries not already significantly involved in laboratory programs. Formal agreements are then developed with interested industries to bring industrial scientists to the laboratories for one year visiting research appointments. Up to 25 visiting appointments will be made in FY 1987 within the requested budget level. Cost sharing with industry will be involved in these appointments. Funds are also included in the FY 1987 request to support model methods and approaches for enhancing the transfer of laboratory based technology to U.S. industries. These approaches will identify and evaluate laboratory technologies with potential spinoff industrial applications. This effort will take fuller advantage of the scientific and technological capabilities at the DOE Laboratories with the purpose of helping to enhance the Nation's industrial competitiveness.

	FY 1985	FY 1986	FY 1987 Request
University Reactor Fuel Assistance......	($ 2,854)	($ 3,753)	($ 1,900)

This program provides fuel for university research and training reactors, particularly those higher powered reactors using Material Test Reactor (MTR) type fuel. The university-based nuclear research and manpower development effort is highly dependent on these specialized facilities not only for nuclear related training but also for research in the basic sciences. Some of the current uses are neutron physics research, trace analysis and radiochemistry, primarily in the fields of human nutrition, health and geochemistry, and research in materials such as structural alloys for fusion reactors, etc. Under the Reactor Sharing Activity, funding is provided to help defray reactor operational costs when the facility is "shared" with researchers from neighboring universities.

At the FY 1987 request level, seven reactors will be provided fuel and approximately twenty reactor sharing grants will be made on a competitive basis. Continued support will also be provided to ship and store excess reactor fuel at DOE Laboratory sites and other efforts responsive to university requests related to NRC requirements.

	FY 1985	FY 1986	FY 1987 Request
Energy Manpower Development..............	$ 770	$ 770	$ 1,300

This subprogram combines two manpower-oriented efforts--the Manpower Assessment effort which conducts studies and analyses of the supply and demand of manpower for both current and future energy R&D programs; and the Energy Education and Training effort which supports activities directed at encouraging secondary school students to pursue energy-related science and engineering programs at the college level.

Energy Manpower Assessment..............	(450)	(385)	(500)

The FY 1987 request of $500,000 for the Manpower Assessment activity will provide support for an in-depth analysis of the employment and utilization of engineering, scientific and related personnel over a 5 year period resulting from changing trends in public and private energy R&D funding and energy production and conservation activities. This effort will require the continued collection and analysis of base line data on the employment, utilization and supply of engineers and scientists in all types of energy-related activities and programs. Major components of this effort include a new survey of doctoral scientists and engineers involved in energy R&D and related activities and an analysis of the involvement of recent BS/MS science and engineering graduates in developing new energy technologies.

Energy Education and Training..........	(320)	(385)	(800)

This program activity supports the Department's longer term R&D mission by encouraging students to pursue energy-related scientific and technical careers. There are four interrelated efforts in this activity: the Pre-Freshman Engineering Program (PREP); the DOE Special Awards Program; high school science teacher institutes; and a high school science student research competition. The Pre-Freshman Engineering Program provides initial training in and exposure to careers in engineering for minority and women high school students through summer institutes at colleges and universities throughout the country. At the FY 1987 request, 20 PREP projects will be conducted reaching an estimated 2,300 students. This is a competitive grant program open to university engineering schools. The DOE Special Awards Program recognizes excellence in student energy research at the annual International Science and Engineering Fair. Each year, ten high school science students, along with their science teachers, receive week-long visits to one of the Department's national laboratories. Also, three laboratories will host high school science teacher workshops during FY 1987 aimed at better preparing classroom teachers in chemistry, physics, computer science and mathematics. Additionally, a high school student research competition program will provide an opportunity for 50-100 highly qualified high school science students to collaborate on energy research projects at selected DOE laboratories during the summer.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
UNIVERSITY RESEARCH INSTRUMENTATION
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
University Research Instrumentation (ER) Operating Expenses.........	$4,950	$6,254	$6,254	$5,000	$-1,254
Total					
Operating Expenses.........	4,950	6,254	$6,254	5,000	-1,254
University Research Instrumentation.........	$4,950[a]	$6,254[b]	$6,254	$5,000	$-1,254

[a] FY 1985 total does not include $50,000 transferred to the SBIR program.
[b] Total reduced by $246,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

Authorization: Section 209, P.L. 95-91

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
UNIVERSITY RESEARCH INSTRUMENTATION

(In thousands of dollars)

1986 Appropriation enacted...	$ 6,500
1986 Gramm-Rudman reduction...	- 246
1986 adjusted...	$ 6,254
Program increases and decreases:	
o Decreases the number of planned instrumentation awards by approximately 6 to 9...	-1,254
1987 budget request...	$ 5,000

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	Gramm-Rudman-Hollings	Subtotal	Comparability Adjustments	Adjusted Approp. Total
University Research Instrumentation (ER)					
Operating Expenses	6,500	-246	6,254		6,254
Subtotal, University Research Instrumentation	6,500	-246	6,254		6,254
Total, University Research Instrumentation	6,500	-246	6,254		6,254

The University Research Instrumentation Program provides support to university research groups on a competitive basis for the purchase of major, state-of-the-art scientific research instrumentation which is essential for continued progress in advanced energy-related scientific and technical research. Continued progress by university researchers in both fundamental energy sciences as well as research directed at improving current and developing new energy technologies requires direct access to new research instrumentation. For example, in the field of materials science, significant effort is being placed on the microanalysis of the structure and chemistry of matter. It is now possible to compare and study the microchemistry and microcrystallography of small samples of metals and ceramic materials. This research requires the use of a new generation of analytical, high resolution high voltage electron miscroscopes. Research advances in this area are directly relevant to long range research needs in fusion, advanced coal conversion, and solar photovoltaics. In the field of biological energy research a major limitation is in understanding the key proteins which influence physiological and genetic factors related to plant productivity. It is particularly difficult to determine the amino acid sequences of polypeptides. However, advances in the analytical capacity of mass spectrometry now offer biological scientists a means to overcome this problem.

Many university scientists do not have direct access to sophisticated, state-of-the-art scientific research instrumentation. This not only hampers their research but also significantly affects the training and preparation of graduate students for future research careers in industry, the university community or government laboratories. This is a serious national problem being addressed through the combined efforts of Federal science agencies, state governments, private industry and by the university community itself. The Federal effort is coordinated by the Office of Science and Technology Policy through the Interagency Committee on University Research Instrumentation. Each participating Federal agency is responsible for supporting university research instrumentation in relation to agency missions and programmatic needs.

The Department's response to this overall national effort is the University Research Instrumentation Program. The program was initiated in FY 1984 to help support the purchase, on a competitive and cost-shared basis, by university researchers of state-of-the-art instrumentation over $100,000 in purchase price.

In FY 1984, 17 competitive awards were made for instruments to support energy-related research in the following research areas: biological energy conversion, nuclear waste isolation, combustion, and multiphase and fluid flow phenomena. In FY 1985, 23 awards were made for instrumentation in the following fields: catalysis, advanced materials characterization, biological energy conversion, geosciences and CO_2 research, and health/environmental impacts of energy-related chemicals. In FY 1986 it is anticipated that 20 to 25 instrumentation awards will be granted. Examples of awards made to universities in both the FY 1984 and FY 1985 University Research Instrumentation program included such instruments as: a scanning Auger microprobe, a tunable dye laser system and several spectrometers (NMR, Ellipsometric, Thermal Ionization Mass, etc.)

	FY 1985	FY 1986	FY 1987 Request
University Research Instrumentation.......	$ 4,950	$ 6,254	$ 5,000

The FY 1987 request for the University Research Instrumentation Program is $5,000,000. This level will support an estimated 15 to 18 competitively selected awards for instrumentation costing over $100,000. As in prior years, the program will concentrate on providing instrumentation support to university research groups which have already demonstrated significant expertise in one of a small number of high priority energy-related topics which are of special concern to the Department's research programs. Among the topics to be considered in FY 1987 are: catalysis, materials characterization and analyses, the geological sciences and health effects research. Specific topics will be selected following discussions with both DOE program staff and university scientists.

The University Research Instrumentation Program remains complementary to but does not replace the Department's efforts to provide support for scientific equipment required on individual research projects supported through the various research programs.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
ADVISORY AND OVERSIGHT - PROGRAM DIRECTION
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
SUPPORTING RESEARCH AND TECHNICAL ANALYSIS

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Energy Oversight, Research Analysis and University Support					
Advisory and Oversight Program Direction					
Operating Expenses....	$2,900	$2,674	$2,674	$2,900	$+ 226
Total....................	$2,900[a]	$2,674[a]/[b]	2,674	2,900[a]	+ 226
Staffing Total FTE's.....	44	44	44	44	

[a] Totals reflect a reduction of $15,000 in FY 1985, $30,000 in FY 1986 and $55,000 in FY 1987 for management initiative savings.

[b] Total reduced by $106,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

Authorization: Section 209, P.L. 95-91.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
ADVISORY AND OVERSIGHT PROGRAM DIRECTION

(In thousands of dollars)

1986 Appropriation enacted..	$ 2,780
1986 Gramm-Rudman reduction..	- 106
1986 adjusted..	2,674
Program increases and decreases:	
o Funding required to maintain FTE level..............................	+ 226
1987 budget request..	$ 2,900

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer. (1)	General Reduction (2)	Management Initiatives (3)	Pay Cost Restoration (4)	FTE General Reduction (5)	Gramm-Rudman-Hollings (6)	ES&H Transfer/ Reprogramming (7)	Subtotal (8)	Comparability Adjustments (9)	Total (10)
University Research Support (ER)										
University Laboratory Cooperative Program Operating Expenses	6,800	-800				-227		5,773		5,773
University Reactor Fuel Assistance Operating Expenses	3,900					-147		3,753		3,753
Energy Manpower Development										
Energy Manpower Assessment Operating Expenses	450	-50				-15		385		385
Energy Education and Training Operating Expenses	550	-150				-15		385		385
Subtotal, University Research Support	11,700	-1,000				-404		10,296		10,296
General Reduction	-1,000	1,000								
Management Initiatives										
Pay Restoration										
Use of Prior Year Balances (URS)										
Use of Prior Year Balances (Other Energy Supply)										
Total, University Research Support	$ 10,700	$ —				$ -404		$ 10,296		$ 10,296

Advisory and Oversight Program Direction

The FY 1987 request for Advisory and Oversight Program Direction is $2,900,000. These funds are required to provide for the personnel and other costs associated with continuation of 44 full-time equivalents. These funds support the staff in the Office of Field Operations Management, the Office of Program Analysis, the Science and Technology Affairs Staff, and associated program and administrative support staff.

This program provides the personnel resources required by the Director of Energy Research to carry out his responsibilities under legislation (P.L. 95-91) and as mandated by the Secretary in areas beyond the scope of the other assigned Energy Research programs. This staff performs and supports in-house and external analyses and studies to meet ER's responsibilities for monitoring the Department's research and development programs and to advise the Secretary with respect to the well-being and management of the multiprogram laboratories. These responsibilities include advising on research activities carried out by any of the Assistant Secretaries; providing support for the Energy Research Advisory Board; operating the Department's multiprogram laboratory institutional planning process; supporting the Under Secretary in addressing laboratory management issues; and providing program management of the Energy Research Analysis, University Research Support, Multiprogram Energy Laboratories-Facilities Support (MEL-FS), R&D Laboratory Technology Transfer, and University Research Instrumentation programs.

The FY 1987 request supports the following staff activities:

1. The Office of Program Analysis will continue to support the Director, Office of Energy Research, in his role as the principal science advisor to the Secretary by providing technical assessments, independent peer reviews and program evaluations, and interagency coordination of research assessments. The Office will also continue to represent DOE on the Interagency Task Force on Acid Precipitation providing assistance as required by the National Acid Precipitation Assessment Plan.

2. The Office of Field Operations Management (FOM) will provide continued support to the Director, OER, in carrying out his oversight, assessment and program responsibilities relating to DOE-university relationships and support. Staff will continue to implement Secretarial guidelines on improved and expanded DOE-university relationships and enhanced information exchange between DOE and the university community. Additional staff workload has resulted from continuing increases in research and manpower development programs within the University Research Support (URS) program. Specifically, increased workload has resulted from expansion of support for the University Laboratory Cooperative (Lab Coop) program, which emphasizes the development of direct links between the DOE laboratories and the university community through support for faculty and student research appointments at the laboratories. Furthermore, the University Reactor Fuel Assistance program, which involves ensuring the maintenance of strong university-based capabilities in nuclear research and training through support for university nuclear research reactors, will require increased activity in FY 1986 in order to be responsive to NRC and congressional mandates on the conversion of university reactors to low enriched uranium (LEU) fuel.

3. FOM is responsible for the University Research Instrumentation program where staff effort is required in preparing an annual program solicitation, analyzing and reviewing proposals, selecting awards, and monitoring projects. The number of proposals received has increased from 150 to 210, and the number of awards has risen from 17 to 24. In addition, the staff is responsible for coordinating this

program with other Federal agencies participating in the overall interagency instrumentation support initiative.

4. Department-wide laboratory management activities of FOM will continue to increase. Specific workload includes provision of laboratory policy and management improvement recommendations and operation of the Department's institutional planning process, analytical support for the Under Secretary's and ER Director's reviews of issues relating to the laboratories, and interaction with the field to ensure implementation of a more effective laboratory appraisal process by the operations offices. Participation in internal working groups and external Government-wide groups will continue to place a significant demand on staff time. Recommendations from these working groups will require increased FOM attention and oversight of Work for Others programs at the laboratories and implementation of new patent legislation by the laboratories. The staff is responsible for ER institutional planning and overview of site plans and related facility issues at the five national multiprogram energy laboratories, as well as management of the MEL-FS construction program, which rehabilitates, upgrades, and replaces, as appropriate, support facilities at the national laboratories. The MEL-FS program has eight new starts proposed in FY 1987. In addition, the program is responsible for the ORNL environmental upgrade program and significant interaction and coordination with the new ES&H assessment program. The staff also manages the Department's R&D Laboratory Technology Transfer program and oversees the new Technology Exchange Research program (under Lab Coop) to provide industry scientists with visiting appointments at the laboratories to strengthen the Nation's industrial competitiveness. There is an increasing staff workload due to significantly increased technology transfer activities at the laboratories.

5. The Science and Technology Affairs Staff will continue to support the Energy Research Advisory Board whose average number of panels doubled in FY 1985 requiring substantial increases in support services; this workload will continue. In addition, three new Departmental awards, similar to the Lawrence and Fermi Awards, have been approved in the areas of conservation, fossil energy and renewable energy. A panel will be established for each of these new awards and the Science and Technology Affairs Staff will provide administrative support to the panels and will coordinate the entire awards process.

6. Program and management support in the areas of budget and finance, personnel administration, policy and coordination, and construction, environment and safety support will continue to be required.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
MAJOR ACTIVITY OVERVIEW

Multiprogram Energy Laboratories - Facilities Support Program

The goal of the Multiprogram Energy Laboratories - Facilities Support (MEL-FS) Program is to provide for the rehabilitation, upgrade, and replacement of multiprogram general purpose facilities at the five multiprogram energy laboratories: Argonne National Laboratory (ANL), Brookhaven National Laboratory (BNL), Lawrence Berkeley Laboratory (LBL), Oak Ridge National Laboratory (ORNL), and Pacific Northwest Laboratory (PNL). These Government-owned sites are complete research reservations with unique research facilities and all necessary support facilities. These include laboratory and office space, craft shops, warehouses, security facilities, fire houses, cafeterias, and all required utility distribution systems plus steam generation plants, sewage and other waste treatment facilities, roads, parking lots, and related structure and facilities, etc. These laboratories have performed national research programs for the Department and its predecessor agencies for nearly 40 years. They received over $1,000,000,000 in FY 1985 to perform national research programs primarily in the areas of energy supply and general sciences (i.e., nuclear energy, fusion energy, basic energy sciences, nuclear physics, high energy physics, life sciences, and other energy-related areas). Over 17,000 scientists, engineers and other support staff are engaged in these activities. The productivity of the work force is greatly affected by the adequacy and reliability of the facilities at the national laboratories.

The replacement costs of the existing facilities at the multiprogram energy laboratories exceed $2,800,000,000. Through continuous use, aging as well as changing technology, these facilities and related support systems deteriorate (both physically and in performance) to a point where they are no longer appropriate for their intended functions, economically justifiable to maintain, or adequate to meet security, environmental, safety, and health requirements. The MEL-FS program is responsible for maintaining existing capabilities and capacities consistent with approved utilization levels. This program will help ensure that the capital base is preserved for continued effective accomplishment of the Department's R&D missions today and in the future. The MEL-FS program is an appropriate Federal role reflecting the responsible management of the Government's real property.

This program consists of two subprograms. The first subprogram, Multiprogram Energy Laboratories - General Purpose Facilities (MEL-GPF), is directed at the goals of the overall program except for Environmental Compliance Upgrade at ORNL which is a separate subprogram. Each subprogram is discussed in detail below.

Multiprogram Energy Laboratories - General Purpose Facilities

The MEL-GPF program originated in FY 1981 as a broad program for rehabilitation, upgrade or replacement of deficient buildings, utilities, roads, railroads and other facilities at all the multiprogram laboratories. From FY 1981 to FY 1986, a total of $188,000,000 has been used for these purposes. Over one third of these funds went to defense multiprogram laboratories (Idaho National Engineering Laboratory, Sandia National Laboratories, Los Alamos National Laboratory, and Lawrence Livermore National Laboratory). Beginning with the FY 1987 budget, the program will be limited to only the Multiprogram Energy Laboratories with Defense Programs assuming responsibility for general purpose facilities projects at the defense multiprogram laboratories.

There exists a large backlog of deficiencies at the Multiprogram Energy Laboratories (recently estimated at over $700,000,000). The purpose of the program is to reduce this backlog in a prioritized and systematic manner. Highest priority is assigned to those projects that address urgent environmental, safety, health and security deficiencies and those that can significantly hamper or interrupt operations. The latter is primarily concerned with utilities - electrical, heating and cooling, compressed air, etc. Next highest priority are those projects that concern efficiency and productivity of operations, including adequate office and laboratory space, warehouse and shop facilities. Facility upgrade plans and all proposed projects and subprojects are consistent with the Institutional plans and Site Development plans for these laboratories.

Environmental Compliance Upgrade at ORNL

Over the years, ORNL has generated a variety of radioactive and nonradioactive wastes and has handled them consistent with the applicable Departmental polices. However, under environmental laws and regulations passed in recent years including the Resource Conservation and Recovery Act (RCRA), the Safe Drinking Water Act, the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the Hazardous Materials Transportation Act, long established procedures and approaches to handling hazardous wastes are no longer acceptable. In addition, the new regulatory requirements have resulted in the application of more stringent environmental criteria to ORNL operations. Consequently, ORNL is in violation of a number of these laws. The violations were verified in part during a recent Evaluation Inspection of ORNL conducted by the State of Tennessee and the Environmental Protection Agency. The Department is continuing to work with these agencies to determine the actions and time schedule necessary to come into compliance. The actions fall into two major categories: those that relate to the modification, replacement or upgrade of existing processes for handling wastes and those that relate to the cleanup of inactive contaminated facilities and sites. While the Department is addressing both areas, correction of ongoing waste processing systems has the highest priority.

The ORNL Environmental Compliance Upgrade Subprogram originated in FY 1985 to address those deficiencies that relate to non-defense activities at ORNL. Defense Waste Management has responsibility for defense related processes and wastes. A multiyear effort will be needed to bring ORNL's active and inactive systems into compliance with existing applicable environmental regulations.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Multiprogram Energy Laboratories-General Purpose Facilities					
Construction.............	$ 33,200	$ 22,819	$ 22,819	$ 34,935	$+12,116
Subtotal MEL-GPF.......	33,200	22,819	22,819	34,935	+12,116
Environmental Compliance (ORNL)					
Operating Expenses.......	0 [a]	9,307	9,307	14,255	+ 4,948
Capital Equipment........	0	962	962	1,000	+ 38
Construction.............	0	6,736	6,736	10,000	+ 3,264
Subtotal Environmental Compliance...........	0 [a]	17,005	17,005	25,255	+ 8,250
Total					
Operating Expenses.......	0	9,307	9,307	14,255	+ 4,948
Capital Equipment........	0	962	962	1,000	+ 38
Construction.............	33,200	29,555	29,555	44,935	+15,380
Multiprogram Energy Laboratories - Facilities Support....................	$ 33,200	$ 39,824 [b,c]	$ 39,824 [b,c]	$ 60,190 [b]	$+20,366

Authorization: Section 647, Public Law 95-91.

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[a] Reprogramming request received final approval April 1985; $5,435,000 was devoted to this activity.

[b] Totals reflect a reduction of $310,000 in FY 1986, and $490,000 in FY 1987 for management initiatives savings.

[c] Total reduced by $1,591,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings). Total reduced by $700,000 for proposed reprogramming to the Environmental Safety and Health (ES&H) Program.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT
(In thousands of dollars)

1986 Appropriation enacted	$41,415
1986 Gramm-Rudman reduction	- 1,591
1986 adjusted	39,824
Program increases and decreases:	
o Provides new construction starts at various locations for Multiprogram Energy Laboratories-General Purpose Facility (MEL-GPF) subprogram	+9,510
o Prior year projects	+2,606
o Environmental Compliance operating expenses to correct environmental problems at ORNL	+4,948
o Project at ORNL for Non-Radiological Process Waste Treatment Facility	+4,113
o Environmental compliance GPP/Capital Equipment	- 811
1987 budget request	$60,190

	FY 1985	FY 1986	FY 1987 Request
Multiprogram Energy Laboratories - Facilities Support....................................	$33,200	$39,824	$60,190

The MEL-FS program is responsible for assuring support facilities at the five energy multiprogram laboratories (ANL, BNL, LBL, ORNL, and PNL) are adequate for accomplishing the research missions assigned them in an efficient manner that meets security, environmental, safety, and health requirements. The General Purpose Facilities (GPF) subprogram and the Environmental Compliance Upgrade subprogram are discussed below.

Multiprogram Energy Laboratories - General Purpose Facilities...........................	33,200	22,819	34,935

As mentioned in the overview, the five multiprogram energy laboratories are complete research reservations with unique research facilities and all necessary support facilities to accommodate over 17,000 scientists, engineers and other support staff. The facilities include over 900 buildings (12,700,000 gross square feet of space) for laboratory and office space, craft shops, warehouses, security facilities, fire houses, cafeterias, vehicle and large equipment maintenance and repair, etc. Further, the laboratories have facilities to generate operating resources such as steam, chilled water, regular and special purpose waters, compressed air etc, and facilities to distribute these and electricity. There exist facilities to handle the many wastes streams (solid, liquid and air) that are generated in the normal course of research and development activities. And, there are roads, parking lots, street lighting, fencing and other site related facilities. The replacement costs of these facilities is over $2.8 billion in FY 1987 dollars.

In the late seventies the department focused attention on the declining overall condition of these facilities and increasing backlog of projects to renovate, upgrade and replace facilities. This led to the creation of this consolidated program (MEL-GPF) in FY 1981. The program systematically and comprehensively addresses the tasks of reducing the backlog and ensuring that facilities adequately meet research requirements as well as safety, health, environmental and security requirements.

The latest assessment of the backlog in FY 1985 indicated $700,000,000 in identified projects. All projects included had to address existing deficiencies only, could not significantly expand existing capacities or capabilities and had to have sound economic justification if space was to be added because of overcrowding, scattered operations or use of leased space. The bulk of these funds ($498 million) are for renovation, upgrade and replacement of existing buildings. Utility upgrades amounted to $184 million, and all other needs at $18 million. (The environmental upgrade needs at ORNL are not included in these estimates - see Environmental Compliance and Upgrade subprogram.)

Several factors contribute to the extensive backlog:

1. Inadequate Building Practices

   Much of the agency's original physical plant was built during times of crisis (e.g. World War II) when either shortages of materials or the urgency of the programs dictated utilizing inferior materials and/or rapid construction techniques. These practices have resulted in premature aging of some of the plant and expansion of routine maintenance to keep the plant on-line. More recently, as programs expanded, temporary facilities such as trailers and prefabricated buildings have been used in lieu of permanent facilities. These have a much shorter life span, and were contemplated to be temporary until more suitable facilities could be provided.

2. Aging and Deterioration

   The aging and wear of facilities, particularly utility systems, affect the reliability of service and increase the downtime and routine maintenance costs for most systems. Real property at the laboratories averages 27 years, with many of the facilities going back to the 1940's and earlier. Many of these buildings and utility systems have no remaining service life and must be replaced to continue operations at the laboratories.

3. Facility Support Lagged Operating Growth

   Improvements to support facilities did not keep up with increases in R&D programs. The result is that existing facilities have been utilized well beyond their design capacities. This is especially noticeable in utility systems, roads, and laboratory facilities. Because adequate permanent facilities have not been available, the laboratories have, of necessity, converted space designed for other purposes (e.g., warehouse space) into laboratory space, and have continued to rely on World War II barrack type buildings which are limited in application and have leased offsite space in several instances. Such solutions can seldom provide the quality laboratory space needed to meet today's research standards.

4. Lack of Institutional Support for GPF

   Prior to the program, the installations suffered from a lack of adequate institutional support largely because they accommodate many programs. All resident programs fund operating expenses to cover the work performed. However, only the assigned lead program (i.e., landlord) had been responsible in the past for providing general purpose facilities, which actually support many or all residing programs. More often than not, budget ceilings have prevented the lead program from accommodating both direct program requirements and institutional needs including general purpose facilities.

The operational impacts of these facilities' deficiencies are: increased operating costs; increased safety, security, health and environmental risks; greater likelihood of program interruption and delay; and lower morale and productivity.

As part of the annual planning process for MEL-GPF, several steps have been taken to assure that most of the above practices are not repeated.

1. The Institutional Planning and Site Development planning processes are designed to ensure orderly planning of the operation, maintenance, and development of the multiprogram laboratories. These processes require careful consideration be given to facility needs, both strategic and specific.

2. A systematic, agency-wide approach to determining funding levels for General Plant Projects (GPP) has been established and a significant effort to increase overall GPP funding has begun.

3. An improved maintenance management system is being implemented to prevent the deferral of maintenance when it is detrimental to the physical well being of necessary facilities.

4. Better project development and management during construction will be utilized to keep the quality of construction high and costs low.

5. Finally, the planning and programming process utilized by the MEL-GPF program will assure that the proper attention is paid to potential critical deficiencies so that they may be corrected prior to any serious impact on mission accomplishment.

To address the most urgent needs, the Department is proposing a FY 1987 budget of $34,935,000. This funding level will just adequately maintain the capability and capacity of the laboratories to effectively support world class energy and general sciences research while meeting the Department's security, health, safety, environmental, and efficiency standards and goals. At this pace, the Department will adequately maintain its investment but the $700,000,000 backlog of deficiencies will not be reduced appreciably. The request for construction funds follow:

	FY 1985	FY 1986	FY 1987 Request
Construction....................................	$33,200	$22,819	$34,935

The FY 1987 request of $34,935,000 for construction is required to continue ongoing projects, and to provide for needed new starts consistent with the plan to eliminate deficiencies developed over a 20 year period. This funding level is considered the essential "base" program. All project costs are supported by completed conceptual designs.

	TEC	FY 1987 Request
1. Continuation of Ongoing Projects.....................		$25,425
Fire Protection Improvements, BNL (86-R-726)........	3,000	2,500
Central Chilled Water Facility, BNL (85-R-701)......	15,000	5,700
Replace Laboratory Roofs, ANL (85-R-702)............	9,800	2,392
Electric Distribution System Upgrade, ORNL (85-R-703)....................................	2,200	1,400
Medical Facility, LLNL (85-R-706)....................	7,300	4,000
Fire Alarm System, RL (85-R-707).....................	4,850	1,225
Central Chilled Water Plant, ANL (85-R-709)..........	5,200	3,600
Central Chilled Water System Restoration ORNL (85-R-712)..	4,700	2,600
Road Repair (Various Locations) (84-ER-103).........	19,190	2,008
2. New Starts..		$ 9,510

The new projects proposed for FY 1987 are identified below. They have been selected based on a prioritization process that gives highest priority to subprojects that address significant environmental, safety, health and security deficiencies. Equally high in priority are subprojects that assure that ongoing research activities are not interrupted or delayed due to failures of support systems or services. These systems include production of steam and chilled water, utility distribution systems. Next highest priority subprojects are those that support the efficiency and productivity of operations, including major upgrading or renovation of buildings to provide adequate housing for the laboratory staff. Many of the subprojects below contain elements at all three

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer. (1)	General Reduction (2)	Management Initiatives (3)	Pay Cost Restoration (4)	FTE General Reduction (5)	Gramm-Rudman-Hollings (6)	ES&H Transfer/ Reprogramming (7)	Subtotal (8)	Comparability Adjustments (9)	Total (10)
Advisory and Oversight Program Direction										
Operating Expenses	2,900	-87			-33	-106		2,674		2,674
Subtotal, Advisory and Oversight Program Direciton..	2,900	-87			-33	-106		2,674		2,674
General Reduction	-87	87								
Management Initiatives										
Pay Restoration										
Use of Prior Year Balances (AOPD)										
Use of Prior Year Balances (Other Energy Supply)										
Total, Advisory and Oversight Program Direction..	2,813	—			-33	-106		2,674		2,674

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	Management Initiatives	Gramm-Rudman-Hollings	ES&H Transfer/ Reprogramming	Subtotal	Comparability Adjustments	Adjusted Approp. Total
Multiprogram Energy Laboratories Facilities Support							
Multiprogram General Purpose Facilities Construction	$ 24,025	$ -310	$ -896		$ 22,819		$ 22,819
Environmental Compliance							
Operating Expenses	10,400	--	-393	-700	9,307		9,307
Capital Equipment	1,000	--	-38	--	962		962
Construction	7,000	--	-264	--	6,736		6,736
Subtotal	18,400	--	-695	-700	17,005		17,005
Subtotal, Multiprogram Energy Laboratories Support	42,425	-310	-1,591	-700	39,824		39,824
Management Initiatives							
Operating Expenses	--	--					
Capital Equipment	--	--					
Construction	-310	310					
Subtotal	-310	310					
Total, Multiprogram Energy Laboratories Facilities Support	$ 42,115	--	$ -1,591	$ -700	$ 39,824		$ 39,824
Operating Expenses	(10,400)		(-393)	(-700)	(9,307)		(9,307)
Capital Equipment	(1,000)		(-38)	(--)	(962)		(962)
Construction	(30,715)		(-1,160)	(--)	(29,555)		(29,555)

priority levels (e.g., replacing an old leaking water system will ensure better fire protection and continued uninterrupted operations and will be less costly to maintain than existing systems). The total estimated cost for each project is based on a completed conceptual design report.

Type of Facilities	TEC	FY 1987 Request
Buildings:		
-Laboratory Restoration I, PNL (87-R-751)..	$ 2,100	$ 2,100
-Piping System Restoration, ORNL (87-R-752)	3,800	725
-Rehabilitate, Laboratory Space (87-R-753) (Building 200), ANL....................	12,035	1,235
Utilities:		
-Mechanical Systems Rehabilitation, ANL.... (87-R-755)	3,200	1,100
-Waterline Replacement, ANL (87-R-756).....	5,200	1,000
-Electrical System Rehabilitation, LBL..... (87-R-757)	2,600	300
-Rehabilitate Mechanical Utilities, LBL.... (87-R-758)	5,500	1,050
-Upgrade Steam Distribution System, ORNL... (87-R-759)	6,800	2,000
Total.............................		$ 9,510

The outyear mortgages for projects contained in the MEL-GPF subprogram are $23,399,000 in 1988, and $8,492,000 in 1989. Fuller descriptions and justifications for these projects are provided in the attached data sheets.

	FY 1985	FY 1986	FY 1987 Request
Environmental Compliance Upgrade (ORNL).............	$ 0*	$17,005	$25,255

As stated earlier in the major activity overview for the Multiprogram Energy Laboratories-Facilities Support Program, the Department is faced with an extensive environmental cleanup effort at ORNL. The environmental projects identified as necessary to be undertaken to ensure compliance with existing State and Federal regulations are significant. These projects range from identifying, monitoring, and cleaning up existing tanks, ponds, and burial grounds containing hazardous and radioactive wastes, to upgrading operating systems and processes for handling radioactive, hazardous, and chemical wastes.

In response to the need for comprehensive characterization of ORNL discharges to the environment, extensive groundwater monitoring and soil/sediment sampling programs were initiated. Characterization plans and site assessments are being proposed to outline multiyear remedial action efforts as required under the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). Well installation was completed around the active surface impoundments in FY 1985, with work to continue through FY 1987 for the placement of an estimated 800 wells at the ORNL site. Near term characterizations are underway for the

*Reprogramming request received final approval April 1985; $5,435,000 was devoted to this activity.

priority sites, including the White Oak Creek Watershed, the RCRA impoundments, and specific Low Level Waste (LLW)-line leak sites. This characterization data will then be used to prepare long term closure plans for over 130 areas contained in the current inventory of contaminated ORNL sites.

In the area of modification, replacement, and upgrading of existing processes, progress has already been made and significant activities are planned. A new Sewage Treatment Plant has been constructed and is now operational. This plant has eliminated a significant National Pollutant Discharge Elimination System (NPDES) noncompliance problem. In addition, some 14,000 feet of sanitary line has been relined to reduce inflow of contaminated water and reduce the load on the plant. Activities are currently underway to characterize the process waste system for similar lining under FY 1986 GPP funding. A total of 22 RCRA compliance groundwater monitoring wells have been installed around active ORNL impoundments under FY 1985 GPP funding.

Upcoming activities will include the construction of a Nonradiological Wastewater Treatment Plant for removal of organics and heavy metals from ORNL process waste streams, continued upgrading of physical integrity of all ORNL waste collection systems, characterization activities for implementation of Best Management Practices as required by the NPDES permit, continued installation of RCRA compliance groundwater monitoring wells, elimination of sources of ORNL nitrate discharges, addition of process waste treatment capability at ORNL Y-12 facilities, installation of additional monitoring capability, and implementation of projects related to management of hazardous and mixed wastes and air pollution control.

It has been determined that $25,255,000 is required in FY 1987 to continue these efforts at ORNL. These funds consist of operating expenses, capital equipment, and construction as follows:

	FY 1985	FY 1986	FY 1987 Request
Operating Expenses..........................	$ 0	$ 9,307	$14,255

The requested operating expense funds of $14,255,000 are required for the following:

- The process waste system is 40 years old and has reached design life expectancy. It has a number of identified problems including the integrity of the drainage system, connection of nonprocess-related drainage, and the lack of treatment available for chemical pollutants. To correct these problems, funds will be utilized to rehabilitate short sections of drainage lines, upgrade various manholes, correct connections of nonprocess wastewater into the system, and update piping drawings. In addition, design criteria, studies, and estimates will be prepared to support capital projects to upgrade the process waste system.

- The ORNL process waste system is in need of repair to prevent the inflow of contaminated groundwater into the system. Funds will be utilized to rehabilitate short sections of pipes, repair manholes, correct piping cross-connects, and update piping drawings.

- The ORNL storm sewer system needs to be upgraded to correct connections with the process waste system and to take corrective actions where the system has been contaminated by past spills of radioactivity and/or hazardous material. Funds will be used for minor corrective actions, to upgrade drawings, to eliminate cross-connects, and to repair and install dikes to isolate storage tanks from the storm sewer.

- Eleven ponds at ORNL will require characterization, alternative assessment, and corrective actions to be in compliance with RCRA/CERCLA. Characterization of the ponds will be completed in FY 1987 and alternative corrective actions will be evaluated. Engineering designs for the final corrective actions will be initiated. In addition, some immediate corrective actions will likely be required to treat contaminated underground water. The extent of groundwater contamination will be determined in FY 1985 and FY 1986 as part of the characterization activities.

- Some 32 past spill sites at ORNL will also require characterization, alternative assessments, and corrective action. Emphasis in FY 1987 will be on characterization and alternative evaluation at the priority sites (3019 and 3028 areas). These efforts will include installation of an extensive groundwater monitoring network, evaluation of the sampling data, and assessment of the alternatives for groundwater control in that area of the Laboratory.

- The White Oak Creek watershed, which drains approximately 6.4 square miles, has received treated and untreated, radioactive and chemical effluent from ORNL activities since 1943. In FY 1987 a major effort to characterize the watershed and to evaluate remedial action alternatives will be made. This effort will result in thorough evaluation of alternatives so that the most cost effective cleanup can be implemented.

- Long range planning and support to GPP projects will continue. In addition NEPA evaluations will be required for ponds, spill sites, and White Oak Creek water shed. The maintenance, surveillance, and decommission planning of selected inactive ORNL facilities will be initiated in FY 1987.

	FY 1985	FY 1986	FY 1987 Request
Capital Equipment..........................	$ 0	$ 962	$ 1,000

The requested capital equipment funds of $1,000,000 are required for general purpose equipment. This equipment will include sludge/soil handling equipment to support cleanup activities described above.

	FY 1985	FY 1986	FY 1987 Request
Construction..............................	0	6,736	10,000

The FY 1987 budget request of $10,000,000 for construction is required for general plant projects and one line item construction project.

	FY 1987 Request
1. General Plant Projects (87-R-770)...........................	$ 3,000

These projects provide for the many miscellaneous alterations, additions, modifications, and replacements of items required to reduce or eliminate environmentally harmful discharges from ORNL. The proposed projects in FY 1987 include replacing failed process and low level radioactive waste lines, installing process wastewater treatment systems, improving groundwater monitoring capabilities, and upgrading hazardous waste facilities.

	FY 1987 Request
2. Nonradiological Process Waste Treatment Facilities (86-R-801) TEC $18,000....................................	$ 7,000

The purpose of this project is to collect and treat the nonradiological waste effluents from ORNL facilities so that they will comply with the water quality requirements set by the State of Tennessee and the Environmental Protection Agency. The project includes pumps, tanks, and piping to transfer wastewater to a central treatment facility and the special equipment necessary to treat the wastewater to the limits established by the National Pollutant Discharge Elimination System (NPDES) permit for ORNL.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Road repair, various locations (ANL, INEL, LBL, RL)

2. Project No.: 84-ER-103

3. Date A-E work initiated: 2nd Qtr. FY 1984

5. Previous cost estimate: $16,000
Date: August 1982

3a. Date physical construction starts: 4th Qtr. FY 1984

6. Current cost estimate: $19,190
Less amount of PE&D: 0
Net Cost Estimate: $19,190
Date: June 1984

4. Date construction ends: 4th Qtr. FY 1988

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 19,500[a]	$ 6,500	$ 6,500	$ 737
1985	0	3,750	3,746	7,098
1986	0	2,973	2,973	3,028
1987	0	2,008	2,008	2,782
1988	0	2,717	2,717	1,917
1989	0	1,242	1,246	2,628
1990	0	0	0	1,000

8. Brief Physical Description of Project

This project is for the restoration, widening, and improvement of roads at various sites to improve traffic safety and bring these roads into conformance with current standards and practices in highway construction. Brief descriptions of each component, by site, follows:

A. Traffic Safety Improvements, Route 4, Richland, Washington - Approximately thirteen miles of Route 4, the arterial road servicing the Hanford area, will be improved to be more consistent with Washington State highway design

[a] $3,500,000 reprogrammed from 82-E-306 in FY 1984.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road repair, various locations (ANL, INEL, LBL, RL)   2. Project No.: 84-ER-103

8. Brief Physical Description of Project (continued)

guidelines. Each lane will be widened approximately 2 feet to provide standard 12-foot lanes. Shoulder surfaces will be treated and widened to provide the standard design width. Acceleration, deceleration, and holding lanes will be provided where required.

Safety hazards such as poles, fire hydrants, and telephone cable boxes will be removed or relocated as required. Appropriate traffic control devices, lane markers, guard rails, roadway signs, pavement markings, and crash protection will be provided as necessary. Connecting service and frontage raods will be upgraded concurrently. The road shall be resurfaced with an asphalt overlay to eliminate the cracked and uneven places and to match and blend with the additions proposed by this project. The intended useful life of this project is 25 years.

B. INEL Road Refurbishment, Idaho National Engineering Laboratory (INEL), Idaho - This project provides for restoring approximately 37 miles of INEL primary and secondary roads to a safe and reliable condition. The project design will provide an engineered road cross section meeting traffic density and load requirements. Since this is not a total reconstruction project, the repair methods will vary from applying an asphaltic leveling course on the existing surface to demolishing and reconstructing the total road cross section. The work method selected will depend on conditions along the route of each section to be restored. The completed roads will have painted traffic striping, proper crown, adequate surface-thickness, engineered base-course, compacted subgrade and side drainage.

C. Roadwork Project - Safety Program, Lawrence Berkeley Laboratory (LBL), Berkeley, California - This project provides for increasing the radius of curves at various intersections and widening of the main access road to the Laboratory. Vertical and horizontal curves will be removed and roads realigned to conform to the Department of Transportation Highway Design Standard. Included will be separation of pedestrian and vehicular traffic in some areas of the complex.

D. Repair Existing Roads, Argonne National Laboratory (ANL), Argonne, Illinois - This project will reconstruct approximately 10 miles of roadway serving the ANL-East Laboratory site. Included in this reconstruction effort are the main entrance routes to the site and those roads serving the principal permanent buildings and facilities. Roads serving buildings that are to be deactivated will not be reconstructed.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road repair, various locations (ANL, INEL, LBL, RL) 2. Project No.: 84-ER-103

8. Brief Physical Description of Project (continued)

Work to be performed includes:

a. Repair of base course failures
b. Resurfacing with 2-1/2 inch bituminous concrete topping
c. Rework and repair of road shoulders
d. Raising existing manholes to match new road alterations
e. Restriping of traffic lanes and crosswalks
f. Replacement of deteriorated culvert pipes

9. Purpose, Justification of Need for, and Scope of Project

A. Traffic Safety Improvements, Route 4, Richland, Washington - Route 4 is the arterial servicing the Hanford Site. This roadway was built in 1943 prior to formalization of national policies on highway design. Lack of conformance to current highway design guidelines has created serious traffic hazards on the Hanford Site. In addition, Route 4 has deteriorated over the years. The road surface is cracked and uneven, lanes are narrow, and in most places the shoulders are soft, narrow and rutted. The existing lanes are only 10 feet wide, 2 feet narrower than required by current standards. The 10-foot lanes allow very little maneuvering room, and create heavy traffic loads along the road edge. This stress causes pavement edge break-up and hence further reduction of lane width, and deep ruts in the shoulders. These factors have caused increased maintenance and safety problems. This project proposes to improve that portion of Route 4 from the 1100 Area to the Wye Barricade, a distance of approximately 13 miles. This area carries the greatest amount of traffic and has the highest accident rate.

B. INEL Road Refurbishment, Idaho National Engineering Laboratory (INEL), Idaho - The roads proposed for reconstruction are the sole access to active INEL Facility areas. They have been maintained in continuous use since their original construction during the 1950's and 1960's. Maintenance efforts since that time have included patching, seal coating and surface overlays. Deterioration in the base course and subgrade has progressed to the point that these efforts provide only short term improvement. In addition, pavement edge-breakage has narrowed the road in some sections to less than the minimum required for safe two-lane operation. The current situation has resulted from combinations of the following circumstances:

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road repair, various locations (ANL, INEL, LBL, RL)
2. Project No.: 84-ER-103

9. Purpose, Justification of Need for, and Scope of Project (continued)

- Existing roads that were not designed for current traffic density and loads which have led to continuing surface and subsurface breakdown.

- Extreme winter cold temperatures ranging to -40°F causing surface course brittleness and shrinkage leading to extensive cracking, subsequent moisture penetration and subsurface failure.

- High summer temperatures ranging to 100°F causing road weakness in areas of minimum road stability. This results in ruts, depressions and washboards on the road surface.

- Moisture entry through surface cracks and unpaved shoulders. This causes reduced subsurface support strength and surface breaking.

- Frost heave caused by soil capillarity and poor drainage during winter weather. This results in both surface breakup and subsurface failure.

C. Road Project - Safety Program, Lawrence Berkeley (LBL), Berkeley, California - The existing radius of the curves of the main access road to the laboratory are such that semi-trailers are found to go over the road center line. In some areas of the laboratory pedestrians and vehicles must use the same road way.

Improvement of the laboratory roading and pedestrian systems is required to bring the old substandard roads and sidewalks in the hilly LBL terrain up to acceptable code and safety standards by improving alignment sight distance, removing horizontal and vertical curves, increasing the radius of curves and widening the access road to the site.

This project will be constructed at the Lawrence Berkeley Laboratory which is non-Government owned property.

D. Repair Existing Roads, Phase I, Argonne National Laboratory (ANL), Argonne, Illinois - The site roads are deteriorating at a faster rate than they can be economically repaired. This deterioration reflects the age of the roads, approximately 30 years, and the severity of the climate at the ANL-East site. Failing road edges, the result of base course failures and late winter thaws, cannot be corrected by patching methods. The use of operating funds in an attempt to maintain the roadways in serviceable condition has resulted in unsatisfactory road conditions at best, and a heavy drain on the Laboratory's resources.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road repair, various locations (ANL, INEL, LBL, RL) 2. Project No.: 84-ER-103

9. Purpose, Justification of Need for, and Scope of Project (continued)

A full reconstruction program for those sections of the roadway network which are in worst condition will be provided by this project.

10. Details of Cost Estimate*

	Richland	INEL	LBL	ANL	Total
a. Engineering and design and inspection	$ 900	$ 535	$ 165	$ 200	$ 1,800
b. Construction costs	5,100	5,800	2,745	1,600	15,245
Subtotal	6,000	6,335	2,910	1,800	17,045
c. Contingency	800	955	190	200	2,145
Total estimated cost	$ 6,800	$ 7,290	$ 3,100	$ 2,000	$19,190

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*Conceptual Design Reports completed.

11. Method of Performance

A. RL Subproject - Design and inspection will be accomplished by a negotiated architect-engineering contract or the on-site architect-engineer firm. The major portion of the construction will be accomplished under fixed-price contracts awarded on the basis of competitive bids. Relocation of any power or utility poles will be accomplished through negotiations with the appropriate utility.

B. INEL Subproject - Overall responsibilities for design and construction will be assigned to the INEL prime contractors administered by DOE-ID. The INEL contractor will provide technical direction of the design effort. Construction will be accomplished by fixed price subcontracts awarded on the basis of competitive bidding.

C. LBL Subproject - Design and inspection will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontract awarded on the basis of competitive bidding.

D. ANL Subproject - Engineering, design and inspection will be performed by Laboratory engineering personnel. Construction will be accomplished by fixed-price contract awarded on the basis of competitive bidding.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road repair, various locations (ANL, INEL, LBL, RL)

2. Project No.: 84-ER-103

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project costs									
1. Total facility costs									
(a) Construction line item....................	$ 0	$ 737	$ 7,098	$ 3,028	$ 2,782	$ 1,917	$ 2,628	$ 1,000	$19,190
(b) PE&D......................	0	0	0	0	0	0	0	0	0
(c) Expense funded equipment..............	0	0	0	0	0	0	0	0	0
(d) Inventories..............	0	0	0	0	0	0	0	0	0
Total facility costs..	$ 0	$ 737	$ 7,098	$ 3,028	$ 2,782	$ 1,917	$ 2,628	$ 1,000	$19,190
2. Other project costs									
(a) R&D necessary to complete construction.	$ 30	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 30
(b) Other project related costs..................	0	0	0	0	0	0	0	0	0
Total other project funding................	30	0	0	0	0	0	0	0	30
Total project costs (1 and 2)..............	$ 30	$ 737	$ 7,098	$ 3,028	$ 2,782	$ 1,917	$ 2,628	$ 1,000	$19,220

b. Other related annual costs (estimated life of project: 25 years)	Annual Cost
1. Facility operating costs..	$ 50
2. Programmatic operating expenses directly related to the facility...............................	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility..	0
4. GPP or other construction related to programmatic effort in the facility......................	0
Total other costs..	$ 50

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Road repair, various locations (ANL, INEL, LBL, RL)
2. Project No.: 84-ER-103

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project Costs:
   1. Total Facility:
      a) Construction Line Item
      b) PE&D - No PE&D required.
      c) Expense Funded Equipment - There is no expense funded equipment.
      d) Inventories - There are no inventories required.

   2. Other project funding:
      a) Research and Development is not necessary for this project. The amount shown covers conceptual design activities.
      b) Other Project Related Costs - No other project related costs are anticipated.

b. Total related funding requirements:
   1. These costs are the average maintenance cost of roads at the various sites. They are based on a cost per square foot of new surface escalated to 1987.
   2. Programmatic Operating Expenses - None
   3. Capital Equipment not Related to Construction - None
   4. GPP or Other Construction Related to Programmatic Effort - No GPP funds are required by this project.
   5. Other Costs - No other costs are anticipated.

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1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Central chilled water facility
Brookhaven National Laboratory
Upton, New York

2. Project No.: 85-R-701

3. Date A-E work initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 1st Qtr. FY 1986

4. Date construction ends: 3rd Qtr. FY 1988

5. Previous cost estimate: none
Date: none

6. Current cost estimate: $15,000
Less amount for PE&D: 0
Net cost estimate: $15,000
Date: September 1983

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1985	$15,000	$ 2,200	$ 2,200	$ 425
1986	0	6,832	6,832	1,292
1987	0	5,700	5,700	6,895
1988	0	268	268	6,388

8. Brief Physical Description of Project

This project proposes the construction of a central chilled water and compressed air facility. It will provide 5,100 tons of refrigeration and 1,500 standard cubic feet per minute (SCFM) of compressed air service for distribution to the following six major research complexes on site: Biology - Building 463; Medical Research Center - Building 490; Physics - Building 510; Applied Mathematics - Building 515; Laboratory Wings - Building 703; Hot Laboratory - Building 801.

The project consists of the installation of approximately 16,000 feet of underground chilled water piping and 8,000 feet of compressed air piping; the erection of one 5,100 ton capacity multicell cooling tower of completely fireproof construction and two buildings (a central chilled water and compressed air structure, and a condenser water pump

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central chilled water facility
Brookhaven National Laboratory
Upton, New York

2. Project No.: 85-R-701

8. Brief Physical Description of Project (continued)

house) having a total gross area of approximately 6,140 square feet and a gross volume of 115,100 cubic feet. Necessary switchgear at 13.8 KV, 2.4 KV and 480 volts, and a 500 KVA transformer substation are also included. Certain utility systems that interfere with construction will be extended, modified, or relocated; these include steam, water, electric power, telephone, and storm and sanitary drains. The present macadam service road (Temple Place) located adjacent to the central steam plant will be extended (20' x 50') in order to provide access to the proposed facility.

The building identified as central chilled water and compressed air structure will be approximately 56' x 90' x 20' high. This building will abut and connect with the south wall elevation of the existing central steam facility.

The building will be approximately 5,040 square feet and will consist of slab-on-grade, steel framing, insulated sandwich wall siding with a built-up insulated roof deck.

The equipment level at grade will contain the following major refrigerations apparatus and associated components: Three 1,700 ton chillers, one 1,500 SCFM air compressor, three chilled water pumps, an automatic central control and monitoring system, electrical switchgear, motor control stations and associated piping and electrical lines.

The condenser water pump house of approximately 1,100 square feet will house two vertical condenser water pumps, and will be constructed with a slab-on-grade, concrete block walls, and built-up roof deck.

9. Purpose, Justification of Need for, and Scope of Project

This project is the most cost effective method for replacing major refrigeration and compressed air equipment that have become obsolete and beyond economical repair. The multiple independent systems that exist at Brookhaven National Laboratory historically have ever increasing operating and maintenance costs as the equipment ages. A new central chilled water facility would have lower maintenance and operating cost, and be able to maximize load diversity presently not possible with the independent building systems.

This project provides a firm base for substantial future reductions in capital construction, maintenance costs and energy consumption. In the future, work and spent individual air conditioning and compressed air systems in other scientific buildings will be replaced with chilled water and compressed air from the proposed central facility.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central chilled water facility
Brookhaven National Laboratory
Upton, New York

2. Project No.: 85-R-701

9. Purpose, Justification of Need for, and Scope of Project (continued)

Background Profile of Existing Systems and Facilities

The existing decentralized systems of air conditioning, refrigeration, and compressed air are the result of each system being conceived as a self-contained entity as opposed to other basic utility services such as electrical power, potable water, waste water, steam, gas, etc., which are extended to a new facility from a central source. Chilled water, however, presently requires refrigeration units (centrifugal, steam absorption, etc.), cooling towers, pumps, electrical equipment, etc. to provide complete and independent systems for supplying environmental air conditioning to each building. This approach has resulted in a multiplicity of equipment and systems.

The major buildings are presently served by 36 units consisting of steam absorption, centrifugal and helical screw, refrigeration water chillers totaling 11,147 tons.

There are approximately 6,500 tons of additional refrigeration installed throughout various complexes. These range from small one-ton window air conditioning units to 150-ton reciprocating refrigeration assemblies.

Proposed Central Chilled Water Facility

It is proposed to construct a central chilled water and compressed air facility as a utility similar to other central facilities. The new chilled water plant will supply the refrigeration requirements for the six buildings and eliminate the use of well water used for once-through cooling at the Medical Research Center. The cooling systems being replaced were installed in the 1950s and 1960s and are obsolete, and beyond their normal life expectancy, and incur increasing operational and maintenance costs each year. In addition, this proposed facility would supply a source of clean, oil-free, low dewpoint compressed air for experimental and utility services within these facilities.

The proposed central chilled water and compressed air facility offers many tangible benefits over the multiplicity of the decentralized systems. Some of the major benefits are:

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central chilled water facility
Brookhaven National Laboratory
Upton, New York

2. Project No.: 85-R-701

9. Purpose, Justification of Need for, and Scope of Project (Continued)

A. Permit new refrigeration systems to be installed at a lower initial cost ($360/ton) as compared with separate, independent systems ($790/ton).

B. Reduce operating and maintenance costs due to the elimination of independent chilled water and compressed air systems by centralization of major equipment.

C. Reduce capital installation costs due to utilization of load diversity among the various complexes.

D. Provide two additional proven wells for integration with the laboratory's potable and firefighting water supply system. The two existing wells in the Medical Research Center used for once-through cooling can be diverted to reinforce the domestic water system capacity.

E. Provide for restructuring of the laboratory's present steam supply by removing from service the existing steam absorption machines (used for cooling). Approximately 148 million pounds of steam per year will be redeployed for better utilization (e.g., 20,000 lbs. of steam per hour for winter heating in lieu of winter air conditioning).

F. Permit the recycling of treated effluent from the central sewage facility for use as make-up at the central steam plant and the proposed central chilled water and compressed air plant. This would reduce the load on the potable water system by approximately 600 gpm.

G. Utilize the return tower condenser water to preheat boiler water make-up (approximately 25,000 GPD) at the Central Steam Facility conserving approximately 90 million pounds of steam a year (equal to saving 700,000 gallons of No. 6 fuel oil).

H. Reduce the energy costs at the six buildings by approximately 56% in today's dollars due to improved utilization and diversity source.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central chilled water facility
Brookhaven National Laboratory
Upton, New York

2. Project No.: 86-R-701

10. Details of Cost Estimate

		Item Cost	Total Cost
a. Architect-engineer, design and inspection at approximately 12% of construction costs, Item c			$ 1,400
b. Land and land rights			0
c. Construction costs			11,400
(1) Improvements to Land		$ 99	
Site preparation (L.S.)	$ 62		
Road and area surfacing, 1000 S.Y. @ $20	20		
Area lighting (L.S.)	17		
(2) Buildings (6,140 S.F. @ approximately $136)		833	
(3) Equipment (within buildings)		6,353	
1700-ton machine (3) @ $516,000	$ 1,548		
Primary chilled water pumps (3) @ $39,000	117		
Secondary chilled water pumps (6) $14,000	84		
Air compressor (1)	107		
Chilled water, condenser, water, compressed air piping and miscellaneous accessories and equipment including site building tie-ins	2,700		
Condenser water pumps (2) @ $52,000	104		
Chemical water treatment system	81		
Automatic control control and monitoring system	905		
Electrical switchgear and distribution	225		
(4) Cooling Tower		530	
(5) Utilities		3,583	
Relocation of piping, electric lines, sewer and storm piping telephone, switchgear and distribution	932		
Chilled and condenser water supply and return piping	2,208		
Compressed air piping, valves (approximately 30 @ $6500), excavation, backfill, etc. for all underground utilities (10,000 ft. @ $46 per ft.)	443		
Subtotal			[illegible]
d. Contingency @ approximately 15% of above costs			2,000
Total estimated cost			[illegible]

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central chilled water facility
Brookhaven National Laboratory
Upton, New York

2. Project No.: 85-R-701

11. Method of Performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project costs						
1. Total facility costs						
(a) Construction line item ..	$ 0	$ 425	$ 1,292	$ 6,895	$ 6,388	$15,000
(b) PE&D	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs ..	0	$ 425	$ 1,292	$ 6,895	$ 6,388	$15,000
Total project costs	$ 0	$ 425	$ 1,292	$ 6,895	$ 6,388	$15,000

b. Other related annual costs (estimated life of project: 20 years)

1. Facility operating cost	$1,549
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort of this facility	0
4. GPP or other construction related to the programmatic effort in the facility	0
5. Other costs	0
Total related annual costs	$ 1,549

The $1,549,000 annual operating cost is estimated as follows:

Maintenance and Operation	$ 317,000
Energy (Utilities)	1,232,000
Total operating costs	$1,549,000

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central chilled water facility
Brookhaven National Laboratory
Upton, New York

2. Project No.: 85-R-701

12. Funding Schedule of Project Funding and Other Related Funding Requirements (continued)

However, if this facility is not funded, the existing systems in the six (6) buildings previously mentioned will have an annual operating cost as follows:

Maintenance and Operation	$ 578,000
Energy (Utilities)	2,341,000
Total operating costs	$2,919,000

The annual savings of non-energy is $261,000 and energy is $1,109,000 for this proposed facility, when constructed.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
  1. Total facility
    (a) Construction line item - Not required
    (b) CP&D - Not required
    (c) Expense funded equipment - Not required
    (d) Inventories - Not required

  2. Other project funding
    (a) R&D necessary to complete - Not required
    (b) Other project related funding - Not required

  3. Capital equipment not related to construction but related to the activity effort in the facility.
    Not required

  4. GPP or other construction related to programmatic effort
    Not required

  5. Other costs
    Not required

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MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Replace laboratory roofs
Argonne National Laboratory
Argonne, Illinois

2. Project No.: 85-R-702

3. Date A-E work initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 4th Qtr. FY 1985

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: none
Date: none

6. Current cost estimate: $ 9,800
Less amount for PE&D: 0
Net cost estimate: $ 9,800
Date: December 1983

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1985	$ 9,800	$ 3,308	$ 3,308	$ 2,110
1986	0	2,983	2,983	3,803
1987	0	2,392	2,392	2,770
1988	0	1,117	1,117	1,117

8. Brief Physical Description of Project

The proposed project will replace built-up membrane roofs on principal general purpose laboratory buildings, giving priority to existing conditions. Approximately 880,000 sq. ft. of roof will be replaced. The work will consist of stripping existing membrane and insulaton where conditions require, patching decks as required, improving drainage by compensating for low spots, installing new current technology membranes designed to best fit field conditions, adding insulation to bring heat transfer resistance up to current DOE standards, and, finally, providing protection to the membranes from temperature extremes and attack from photochemical activity. Flashings, curbs, gravel stops, and fascia will be renewed as their conditions dictate. Satisfactory function of roofing components will be warranted for 10 years, directly by the material manufacturers.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Replace laboratory roofs
Argonne National Laboratory
Argonne, Illinois

2. Project No.: 85-R-702

9. Purpose, Justification of Need for, and Scope of Project

The purposes of this project are to restore the weather tightness of roofs on laboratory buildings, and to bring the resistance to heat transfer up to current Federal energy use standards. This project provides a multi-year plan, described in the ANL Institutional Plan, FY 1983-FY 1985, whose goal is the replacement of all roofs older than 25 years on permanent general purpose buildings. At this age they have exceeded normal life expectancy for conventional built-up membrane construction. Resources expended on reconditioning efforts exceed good business judgment, yet the research programs housed under the roofs have been impacted.

Total replacement is required. Programs housed in these buildings include Basic Energy Research, Fossil Energy Research, Conservation, Renewable Energy, Environmental Protection, Safety, and Emergency Preparedness. Twenty one buildings are scheduled with approximately 880,000 square feet of roof needing immediate attention.

10. Details of Cost Estimate

ANL has replaced over 70,000 square feet of roofs since 1982 under five separate competitively bid contracts. In addition to the roof area, the amount of roof and insulation to be removed, the relative number of roof penetrations and other complications to be provided all produced a range of unit prices from $6.03 to $8.68 per square foot when normalized to mid-1982. The mean unit cost derived from these bids was $7.30 in mid-1982.

The various elements contributing to the total unit cost of roof replacement are identified in the following table:

Job Cost Breakdown

Cost Element	$ Per Sq Ft Mid-1982
Tear-off of old roof and insulation (90% of roof area)	$1.34
Preparation of substrate	0.38
Improve water drainage (average)	1.04
Single-ply PVC membrane	1.48
Irma Board - 2" thick insulation	2.04
Pro-rated edge and penetration details (average)	1.02
Warranties (included in above costs)	--
Estimated total	$7.30

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Replace laboratory roofs
Argonne National Laboratory
Argonne, Illinois

2. Project No.: 85-R-702

10. Details of Cost Estimate (continued)

The following estimated total cost of the project is for the construction of approximately 200,000 square feet for three years, 80,000 square feet in the last year of the project. The above unit cost of $7.30 in mid-1982 has been escalated for each annual increment of construction, using the escalation rates projected below.*

	Total Cost
a. Engineering, design and inspection at approximately 11% of construction, Item b.	$ 900
b. Construction costs, 880,000 sq. ft. @ $10.80/sq. ft.	8,000
c. Contingency @ approximately 10% of above costs	900
Total estimated cost	$ 9,800

*Based upon a completed conceptual design and current cost data.

11. Method of Performance

Engineering, design and inspection will be performed by laboratory engineering personnel. Construction will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project costs						
1. Total facility costs						
(a) Construction line item	0	$ 2,110	$ 3,803	$ 2,770	$ 1,117	$ 9,800
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs	0	$ 2,110	$ 3,803	$ 2,770	$ 1,117	$ 9,800

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Replace laboratory roofs
Argonne National Laboratory
Argonne, Illinois

2. Project No.: 85-R-702

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12. Funding Schedule of Project Funding and Other Related Funding Requirements (continued)

	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	Total
2. Other project costs						
(a) R&D necessary to complete construction	0	0	0	0	0	0
(b) Other project related costs	8	0	0	0	0	8
Total other project costs	$ 8	$ 0	$ 0	$ 0	$ 0	$ 8
Total project costs (Items 1 and 2)	$ 8	$ 2,110	$ 3,803	$ 2,770	$ 1,117	$ 9,808

b. Other related annual costs (estimated life of project: 20 years)

1. Facility operating costs	0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual costs	0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
   1. Total facility
      (a) Construction line item - No narrative required
      (b) PE&D - None
      (c) Expense funded equipment - None
      (d) Inventories - None

   2. Other project funding
      (a) No R&D effort is required
      (b) $8,000 spent for conceptual design

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Replace Laboratory Roofs
Argonne National Laboratory
Argonne, Illinois

2. Project No.: [illegible]

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

b. Total related funding requirements - The roofing components to be replaced or rehabilitated will have useful lifetimes of approximately 20 years.

1. Facility operating costs - Implementation of this project will rehabilitate or replace physical components of buildings. This will result in a reduction of maintenance costs while restoring the respective system components to an acceptable level of operational efficiency, thus the facility operating cost is reported as zero.

2. Programmatic operating expenses directly related to the facility - Although this project will rehabilitate general purpose facilities employed to perform a wide variety of activities, there is no programmatic operating expense directly related to, or required for supply of this project, thus the programmatic operating expenses is reported at zero.

3. Capital equipment not related to construction but related to the programmatic effort in the facility - None

4. Maintenance, repair, GPP or other construction related to programmatic effort - None

5. Other costs - None

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MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Primary electrical distribution system restoration
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 85-R-703

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3. Date A-E work initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 4th Qtr. FY 1985

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate:
Date: none

6.	Current cost estimate:	$ 2,200
	Less amount for PE&D:	0
	Net cost estimate:	$ 2,200

Date: September 1983

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7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1985	$ 2,200	$ 800	$ 800	$ 229
1986	0	0	0	440
1987	0	1,400	1,400	671
1988	0	0	0	860

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8. Brief Physical Description of Project

This project will involve a series of restoration activities which will increase the reliability of the existing electrical distribution system to an appropriate level. These activities will include repair or replacement of

1. Title and location of project: Primary electrical distribution system restoration
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 85-R-703

8. Brief Physical Description of Project (continued)

deteriorated components, replacement of deficient items, and the elimination of potential safety and environmental hazards. Deteriorated equipment to be replaced includes wooden poles, transformers, and cables. Correction of deficiencies include replacing fused disconnect switches with electrically-operated circuit breakers, improving lightning protection of overhead lines, and replacement of single-pole switches with three-pole switches. Correction of potential safety hazards includes additional isolation switches for buildings and facilities and improved relaying. Correction of potential environmental hazards includes replacing deteriorated liquid-filled (oil and polychlorinated biphenol [PCB]) transformers.

9. Purpose, Justification of Need for, and Scope of Project

This project will renew and upgrade the existing primary electrical distribution system to an appropriate level of reliability and enable it to effectively support various research activities at the Laboratory. Much of this system at Oak Ridge National Laboratory (ORNL) was built in 1943. Many of the components are beyond their expected life and are showing clear evidence of deterioration to the point where an escalating number of failures are projected. Examples of this deterioration are: (1) several oil filled transformers which have become severely corroded internally due to moisture and acid content will be replaced; (2) fused disconnect switches will be replaced with the electrically operated circuit breakers; (3) unshielded cable which is in violation to the National Electric Code will be replaced with approved shielded cable; (4) lightning protection will be improved on those circuits supplying the High Flux Isotope Reactor, Transuranium Processing Plant, Health Physics Research Reactor and to the Tower Shielding Facility thereby increasing the reliability of these circuits.

In addition, single pole switches will be replaced with three pole switches. This change will allow operating personnel to be better utilized during emergency conditions and reduce switching time which results from waiting for called in maintenance personnel.

The cost estimate is based on a conceptual design completed during FY 1982 and will be issued during FY 1983 at an estimated cost of $20,000.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Primary electrical distribution system restoration
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 85-R-703

10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 13% of construction costs, item b		$ 220
b. Construction costs		1,720
(1) Outside utilities	$, 1,720	
Subtotal		$ 1,940
c. Contingency at approximately 13% of above costs		260
Total estimated cost		$ 2,200

*Based on a Conceptual Design Report completed in FY 1982 at a cost of approximately $20,000.

11. Method of Performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

Not Required. TEC is less than $5,000,000.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not Required. TEC is less than $5,000,000.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
MUTLIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Medical facility
Lawrence Livermore National Laboratory
Livermore, California

2. Project No.: 85-R-706

3. Date A-E work initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 1st Qtr. FY 1986

4. Date construction ends: 1st Qtr. FY 1988

5. Previous cost estimate: None
Date: none

6. Current cost estimate: $ 7,300
Less amount for CP&D: 0
Net cost estimate: $ 7,300
Date: September 1983

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1985	$ 7,300	$ 500	$ 500	$ 196
1986	0	2,694	2,694	2,194
1987	0	4,000	4,000	4,804
1988	0	106	106	106

8. Brief Physical Description of Project

This project will provide a 25,600 gross square foot building for a new and expanded facility for Health Services and will house all of the 32 medical staff and support personnel. The functions accommodated in this space will be a waiting area, receptionist, interview rooms, administrative offices, records area, health maintenance offices, physical examination rooms, observation room, emergency treatment (major and minor), diagnostic laboratories, specimen rooms, X-ray room, dark room/process lab, autoclave and clean hold area, ambulance entry, personnel decontamination facility, eye safety examination rooms, toilets, storage and equipment rooms.

The building will be designed to relate to the existing nearby major facilities and will be constructed of fire-resistive materials. Fire sprinkler system as well as other safety devices, will be installed. Normal medical laboratory building utilities, heating, ventilation, power, lighting, and communication systems will be provided. The building will be cooled by mechanical refrigeration. In addition, the decontamination area will require special ventilation, sewage retention tanks, and floor treatment. Energy conserving design will be utilized throughout the facility.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Medical facility
Lawrence Livermore National Laboratory
Livermore, California

2. Project No.: 85-R-706

8. Brief Physical Description of Project (continued)

Normal site utilities will be extended from mains and connections to storm and sanitary sewers will be made. Electrical power will be extended from high voltage feeders to a new substation serving this building. Area lighting will be installed for safety and security. Site development will comply with the Master Site Plan and will include grading, paving, off-street parking, curbs, gutters, sidewalks, fencing, security screens, and minimal landscaping.

9. Purpose, Justification of Need for, and Scope of Project

Adequate health service support to the over 7600 employees of Lawrence Livermore National Laboratory (LLNL) primarily consists of two major elements. First, preventative approaches to both the physical and mental health of the work-force. This is accomplished through performance of over 3500 physical examinations a year, attention to the potential hazards of one of the country's foremost applied physics and engineering facilities and support to those who may be unduly stressed by working in such an environment. Second, is the availability of adequate emergency response to a very broad spectrum of hazards ranging from intense radioactivity, through almost every possible chemical, mechanical and electrical risk, to the "normal" falls, cuts, etc., that go with a dynamic population that includes over a thousand contractor employees in addition to the LLNL staff. Although blessed with one of the best safety records of the national laboratories, the health services facility must be prepared for major incidents.

The current health facility is housed in a 40 year old World War II barracks building that is shared with the South Badge Office. It was barely adequate for a medical staff of less than 20 and a population of less than 5,000. Today the building limits physical examinations to approximately two thirds of the DOE guidelines for a laboratory of LLNL's size. Several other health services required by DOE order, DOT regulation, California code, American National Standards Institute (ANSI) standards, and LLNL policy are currently not being provided due to the physical restraints of the current building. For example, in the event of persons being contaminated with radioactive, toxic, or carcinogenic materials, they cannot be adequately treated without significant risk to the current facility and attending personnel. A special unit needs to be constructed to deal with this particular type of emergency situation. The present facility is generally not capable of handling a large variety of emergency situations nor a large number of casualties.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Medical facility Lawrence Livermore National Laboratory Livermore, California	2. Project No.:	85-R-706

10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 13% of construction costs		$ 700
1) Title I & II	$ 400	
2) Title III	300	
b. Construction costs		5,550
1) Improvements to land including grading, paving, walks and landscaping	550	
2) Buildings Medical, 25,600 sq. ft. at $162 per sq. ft.	4,150	
3) Utilities, including mechanical, power, communications, storm and sanitary sewer.	850	
c. Standard equipment		140
d. *Relocation cost		100
Subtotal		$ 6,490
f. Contingency at approximately 12% of other costs (except item a. and c. above)		810
Total estimated cost		$ 7,300

*Based on complete conceptual design.

11. Method of Performance

This project will be designed and constructed under a procedure commonly referred to as turnkey contracting. The project will be competitively bid with each bidder submitting a design and cost proposal. Minor work will be performed by LLNL forces.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Optical Facility
Lawrence Livermore National Laboratory
Livermore, California

2. Project No.: [illegible]

IV. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project costs						
1. Total facility costs						
a. Construction line item	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b. PE&D	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
c. Expense funded equipment	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d. Inventories	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total direct costs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2. Other project costs						
a. R&D necessary to complete construction	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b. Other project related costs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total other project costs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total project costs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

b. Other related annual costs (estimated life of facility: [illegible] years)

1. Facility operating costs	[illegible]
2. Programmatic operating expenses directly related to the facility	[illegible]
3. Capital equipment not related to construction but related to the programmatic effort in the facility	[illegible]
4. GPP or other construction related to programmatic effort in the facility	[illegible]
5. Other costs	[illegible]
Total other related annual funding costs	[illegible]

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Medical Facility
Lawrence Livermore National Laboratory
Livermore, California

2. Project No.: 85-R-706

II. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
   1. Total facility costs
      a. Construction line item - No narrative required.
      b. Expense funded equipment - No narrative required.
      c. Inventories - No narrative required.
   2. Other project funding
      a. R&D necessary to complete construction
      Total funding in this classification represents the conceptual design cost and other studies determined to be necessary.
      b. Other related project cost - No narrative required.

b. Total related funding requirements

   1. Facility operating costs - Operating costs of the facility are estimated to be $226,000 per year including $92,000 escalation (based on FY 1983 average maintenance and utility cost of $5.20 per sq. ft., escalated to $6.83 in FY 1987. Maintenance cost escalated at 7% per annum, and utility cost escalated at 15% per annum).

   2. Programmatic operating expenses directly related to the facility - This estimate is for 32 total programmatic and support personnel at $122,340 average per person in FY 1987. Ninety percent of these people are presently housed in existing scattered buildings and trailers and will be moved to this new facility. The operating funds for these people are a normal part of the past and current program. The remaining 10 percent represent growth projected to FY 1987. Funds for this growth have been included in program projections.

   3. Capital equipment not related to construction but related to the programmatic effort in the facility - This is an average annual estimate which includes both the small items needed for continuous operation of the facility and the occasional large item over $100,000 which cannot be described at this time, but can be predicted as needed to maintain technical excellence in efforts conducted in the facility.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Medical facility
Lawrence Livermore National Laboratory
Livermore, California

2. Project No.: 85-R-706

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (continued)

4. Maintenance, repair, GPP or other construction related to programmatic effort - None

5. Other costs - No narrative required.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
MUTLIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Hanford site fire alarm system upgrade
Richland, Washington

2. Project No.: 85-R-707

3. Date A-E work initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 2nd Qtr. FY 1986

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: none
Date: none

6. Current cost estimate: $ 4,850
Less amount for PE&D: 0
Net cost estimate: $ 4,850
Date: September 1983

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1985	$ 4,850	$ 1,300	$ 1,300	$ 91
1986	0	1,708	1,708	2,078
1987	0	1,225	1,225	1,514
1988	0	617	617	1,167

8. Brief Physical Description of Project

This project provides for the design, procurement and construction of an upgraded fire alarm system which will be commensurate with required levels of protection for the Hanford Site. The project will replace all existing master alarm boxes and street boxes with radio boxes, replace alarm receiving equipment and consoles at the fire stations, and provide a computer aided dispatch system.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Hanford site fire alarm system upgrade
Richland, Washington

2. Project No.: 85-R-707

8. Brief Physical Description of Project (continued)

This project will replace approximately 240 master alarm boxes and 50 street boxes, which are distributed throughout the site. This will require additional equipment to interface the new master boxes with the existing detector circuits in the facilities. The existing alarm receiving equipment at the fire stations will be replaced with new equipment compatible with the new alarm boxes. Significant features of the new alarm receiving equipment includes printout of facility location and alarming zone within the facility. This equipment will be supplemented with a new computer aided dispatching system. This will increase the efficiency of responding emergency personnel by providing information not available with the existing system. This includes information such as type of occupancy, recommended extinguishing agents, and adjacent conditions.

9. Purpose, Justification of Need for, and Scope of Project

The purpose of this project is to update the existing fire alarm system with a more reliable and efficient system. There has been no significant overhaul of the Hanford fire alarm system since the site was originally established in the early 1940's. Some system components are approaching 50 years in age. Repair of components is difficult at best due to the lack of spare parts. Overhead conductors are generally in excess of 20 years old with significant amounts in excess of 30 years old. Due to the normal aging process the insulation of these conductors is brittle and breaks easily leaving conductors exposed and permitting faults in the system. In some locations, alarms are transmitted to the fire stations on underground conductors. Major portions of these lines are uncharted and are subject to dig-ups during construction and maintenance activities.

Due to deterioration and age of the system components, numerous false and nuisance alarms as well as ground faults occur. Records of alarm signals for calendar years 1979, 1980 and 1981 indicate alarms due to electrical problems, malfunctions, atmospheric phenomenon, and equipment failures ranged between 28 and 37 percent of the total number of alarms received. It is estimated that the proposed system could eliminate 50 percent of these alarms.

As the facilities at the site have been increased in size as well as number, additions to the fire alarm reporting system have been made to cover them. Unfortunately, by necessity, requirements of the National Fire Codes have been violated. These violations concern connection of detectors to master alarm boxes in an unacceptable manner, inadequate annunciation, and inappropriate alarm receiving at the fire stations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Hanford site fire alarm system upgrade
   Richland, Washington

2. Project No.: 85-R-707

9. Purpose, Justification of Need for, and Scope of Project (continued)

The need for the fire alarm system upgrade is based on an audit report done in June 1982 by consultants specializing in fire protection and safety engineering. The audit report identifies 30 categories of deficiencies within the existing fire alarm system. An Engineering Study addressed alternative solutions for correcting existing deficiencies. Through the site survey, overall system analysis, and the consultant's fire alarm system expertise, it was concluded that to achieve compliance with National Fire Protection Association (NFPA), ensure system reliability, future flexibility and ease of operation, a Radio fire alarm system alone fulfilled these requirements.

Delay of this project will increase the risk of serious fire accidents due to continued aging of the system and its components. Also, maintenance costs of the existing system will continue to increase.

10. Details of Cost Estimate

	Item Cost	Total Cost
a. Engineering design and inspection at approximately 13% of construction costs		$ 500
b. Construction costs		3,720
(1) Construction (includes equipment and labor)	$ 1,910	
c. Standard equipment includes 6 consoles ($54,000/ea.) computer aided dispatch system ($204,000) and approximately 278 radio alarm boxes ($4,600/ea.)	1,810	
Subtotal		$ 4,220
d. Contingency at approximately 15% of above cost		630
Total estimated cost..............		$ 4,850

11. Method of Performance

Design, inspection, and construction will be accomplished by fixed-price contracts awarded on the basis of competitive bidding. It will be a design, procure and install contract as presently planned.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

Not required. TEC is less than $5,000,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Hanford site fire alarm system upgrade Richland, Washington	2. Project No.: 85-D-707

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not required. TEC is less than $5,000,000.

DEPARTMENT OF ENERGY
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
([illegible])

1. Title and location of project: [illegible]
Argonne National Laboratory
Argonne, Illinois

2. Project No. [illegible]

3. Date A-E work initiated: [illegible]

3a. Date physical construction starts: [illegible]

4. Date construction ends: [illegible]

5. Previous cost estimate: [illegible]

6. Current cost estimate: [illegible]

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

8. Brief Physical Description of Project

[illegible]

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central chilled water plant
Argonne National Laboratory
Argonne, Illinois

2. Project No.: 85-R-709

9. Purpose, Justification of Need for, and Scope of Project

The proposed project offers an integrated, cost-saving alternate to piecemeal replacing of worn out water chillers. The water chillers installed during construction of the Laboratory are beyond their normal life expectancy; to maintain active research operations, the ANL Institutional Plan, 1983-1988, identifies a nearly $6,000,000 program of chiller replacement. By establishing a central water chilling plant, greater reliability and more economical operations are possible. A 1977 ANL engineering study aimed at integrated water chilling facilities identified the savings and also pointed to savings possible by retiring steam-driven chillers in favor of electrical. However, when combined with the unavoidable necessity of replacing worn out chillers, the central plant concept is definitely attractive, offering both immediate benefits and greatly enhanced potentials. The annual estimated savings in energy, repair, and maintenance, in 1983 dollars, is approximately $500,000 for providing a central chilled water plant to replace eight existing steam driven chillers in the above mentioned four buildings.

In addition to the benefits of central chilled water supply, this project makes use of existing facilities: i.e., the vacant area in Building 370 and the under-utilized electric substations and pumped cooling tower water lines from the cooling tower near Building 370. If these under-utilized facilities were not available, a new building for the central chillers complete with new cooling towers, pumps, and electrical substation would have to be constructed at an additional cost to the project of $763,000. The capacity built into the existing facilities will accommodate the central chilling concept, yet allow a generous margin to attract future research programs. Superimposing the water chilling function offers assurance that the existing facilities will remain profitably available in good condition.

10. Details of Cost Estimate

	Item Cost	Total Cost
a. Engineering, design and inspection at 18% of construction, Item b..............		$ 600
b. Construction costs		3,270
(1) Valve pits	$ 135	
(2) Trenching and backfill	460	
(3) Buried chilled water piping	1,280	
(4) Piping and equipment within buildings	1,170	
(5) Controls and metering	60	
(6) Electrical power for chillers and pumps	165	
Subtotal..		$ 3,870

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central chilled water plant
Argonne National Laboratory
Argonne, Illinois

2. Project No.: 85-R-709

10. Details of Cost Estimate (continued)

	Total Cost
c. Procurement costs (chillers, primary pumps & strainer)	600
d. Contingency - 16.3% of engineering, construction & procurement	730
Total estimated cost...	$ 5,200

11. Method of Performance

Engineering, design and inspection will be performed by laboratory engineering personnel, aided by outside A/E firms. Construction will be accomplished by fixed-price contract awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1986	FY 1987	FY 1988	Total
a. Total project costs					
1. Total facility costs					
(a) Construction line item ...	$ 0	$ 750	$ 3,000	$ 1,450	$ 5,200
(b) PE&D	0	0	0	0	0
(c) Expense funded equipment..	0	0	0	0	0
(d) Inventories	0	0	0	0	0
Total facility costs ...	$ 0	$ 750	$ 3,000	$ 1,450	$ 5,200
2. Other project costs					
(a) R&D necessary to complete construction	0	0	0	0	0
(b) Other project related costs	20	0	0	0	20
Total other project costs	$ 0	$ 0	$ 0	$ 0	$ 0
(Items 1 and 2)	$ 20	$ 750	$ 3,000	$ 1,450	$ 5,220

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central chilled water plant
Argonne National Laboratory
Argonne, Illinois

2. Project No.: 85-R-709

12. Funding Schedule of Project Funding and Other Related Funding Requirements (continued)

b. Total related funding requirements (estimated life of project: 20 years) - N/A

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
   1. Total facility costs (N/A)

   2. Other project funding
      (a) No R&D effort is required
      (b) $20,000 spent for conceptual design

b. Total related funding requirements - The central water chilling facility to be established will have a useful lifetime upwards of 20 years.

   1. Facility operating costs - Implementation of this project will replace existing physical functions within individual buildings with a central plant. This will result in a reduction of maintenance and operating costs while restoring an acceptable level of operational efficiency to existing facilities, thus the facility operating cost is reported as zero.

   2. Activity operating expenses directly related to the facility - Although this project will restore and replace general purpose facilities employed to perform a wide variety of activities, there is no activity operating expense directly related to, or required for support of this project, thus the activity operating expense is reported as zero.

   3. Capital equipment not related to construction but related to the activity effort in the facility - None.

   4. GPP or other construction related to activity effort - None

   5. Other costs - None

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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Central chilled water system restoration
Oak Ridge National Laboratory, Tennessee

2. Project No.: 85-R-712

3. Date A-E work initiated: 1st Qtr. FY 1985

3a. Date physical construction starts: 1st Qtr. FY 1986

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: None
Date: None

6. Current cost estimate: $ 4,700
Less amount for CP&D: 0
Net cost estimate: $ 4,700
Date: September 1983

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1985	$ 4,700	$ 1,000	$ 1,000	$ 556
1986	0	1,058	1,058	862
1987	0	2,600	2,600	2,240
1988	0	42	42	1,042

8. Brief Physical Description of Project

This project will remove from service three obsolete 600 ton chiller units located in the Central Research and Administration Complex and provide replacement capacity. The Central Compressor Facility structure will be expanded, if required, for the installation of 2,000 ton centrifugal chiller and the associated pumps, controls, and piping. Concurrently, the cooling tower system supplying condenser water to the facility will be upgraded to correct a marginal capacity condition during peak demand periods.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central chilled water system restoration
Oak Ridge National Laboratory, Tennessee

2. Project No.: 85-R-712

9. Purpose, Justification of Need for, and Scope of Project

The purpose of this project is to: replace three 600 ton chiller units due to age, condition, and limited capacity; increase capacity of a marginal cooling tower system.

The Central Research and Administration Complex consists of seven major facilities with approximately 1,000,000 sq. ft. of floor space and approximately a third of the Laboratories' research personnel. The space is used by multi-discipline groups and supporting service divisions participating in applied and basic research programs.

The units to be replaced were obtained from surplus channels in 1952 and are now approximately 35 years old. Their reliability continues to decline, and, in recent years, two of the three machines have been out of service for several weeks or more. Repair parts are no longer stocked by the manufacturer and downtimes are extended by the need to custom fabricate the necessary parts.

The declining reliability of these machines will continue and more frequent interruptions and greater delays to programmatic activities can be anticipated. Many programmatic activities are dependent on computer services and the ORNL Computer Center located in the area served by the 600 ton chillers.

10. Details of Cost Estimate*	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 12% of construction costs, item b.		$ 450
b. Construction costs		3,700
(1) Land improvements including grading, landscaping	$ 43	
(2) Building addition (2,500 sq. ft. @ $153/sq. ft.)	362	
(3) Building modifications (concrete work, etc.)	131	
(4) Other structures (cooling tower)	419	
(5) Special facilities (chiller, pumps, piping, etc.)	2,745	
Subtotal		$ 4,150
c. Contingency at approximately 13% of above costs		550
Total estimated cost		$ 4,700

*Cost estimate based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Central chilled water system restoration Oak Ridge National Laboratory, Tennessee	2. Project No.: 85-R-712

11. Method of Performance

Design and inspection will be on the basis of a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

Not required. TEC is less than $5,000,000.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not required. TEC is less than $5,000,000.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES PROGRAM
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Fire protection improvements (phase II)
Brookhaven National Laboratory (BNL)
Upton, New York

2. Project No.: 86-R-726

3. Date A-E work initiated: 2nd Qtr. FY 1986

3a. Date physical construction starts: 3rd Qtr. FY 1986

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: None
Date: None

6. Current cost estimate: $ 3,000
Less FY 1984 PE&D: 0
Net cost estimate: $ 3,000
Date: December 1984

7. **Financial Schedule:**

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$ 3,000	$ 481	$ 481	$ 281
1987	0	2,500	2,500	1,700
1988	0	19	19	1,019

8. **Brief Physical Description of Project**

This project provides for the design, fabrication and installation of various fire protection improvements affecting over 210,000 sq. ft. of building space. The improvements consist of:

1. Providing automatic sprinkler protection in basement, laboratories and storage areas of facilities designated as high loss potential areas. Areas included are Building 510, 555, 815, 830, 901 and 928.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Fire protection improvements (phase II)
Brookhaven National Laboratory (BNL)
Upton, New York

2. Project No.: 86-R-726

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8. Brief Physical Description of Project (continued)

2. Provide complete or partial automatic sprinkler protection (either new, or extension of existing systems) in buildings of combustible contents and/or construction which have a direct impact or exposure to DOE programs. These include Buildings 130, 179, 211, 355, 356, 480, 610 and 923.

3. Transferring the existing fire alarm panels from BNL's old telegraph system to BNL multiplexed central alarm station (completion of a multiplexed central alarm station is scheduled in FY 1985). This will eliminate basic operational deficiencies in the existing system and bring BNL into full compliance with general industrial standards and DOE guidelines.

4. Raising the level of fire protection at Building 30 (Brookhaven Center) and other miscellaneous buildings to improve the life safety aspects. These improvements include: modifications to exits to comply with the National Fire Protection Association (NFPA) 101 (the Life Safety Code), extending sprinkler protection into unprotected areas, installing fire extinguishing systems above localized areas of high hazards (i.e., grills, deep fat fryers).

All installations and modifications will be in accordance with DOE recommended standards. Specifically, sprinkler protection will conform to National Fire Protection Association Standard 13. Sprinkler systems will be hydraulically designed to minimize costs. Wetpipe system on 100 sq. ft. spacing will be used in heated areas. Dry pipe systems will be used for unheated or partially heated areas. Water supplies will be taken from the existing BNL site water distribution system.

Transferring the fire alarm system to BNL's new central station facility will include all the work necessary to comply with the National Fire Code's 72 Series and DOE Orders.

9. Purpose, Justification of Need for, and Scope of Project

The purpose of this project is to reduce the risk of loss due to fire at BNL. Only key facilities have been included. Key facilities are defined as:

a. Buildings containing operations directly involved in DOE program activities; or

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Fire protection improvements (phase II)
Brookhaven National Laboratory (BNL)
Upton, New York

2. Project No.: 86-R-726

9. Purpose, Justification of Need for, and Scope of Project (continued)

b. Vital support buildings for program buildings

Each key facility was examined in relation to several interrelated risk factors: potential dollar loss due to fire, effectiveness and reliability of existing fire protection (if any), amount of combustibles present, type of potential fire (i.e., smokey, flash, average), access by fire department, salvageability, potential extension of fire, impact on experiments, and life safety of occupants. Automatic sprinkler protection has been proposed over fire detection since the above factors were especially unfavorable (i.e., difficult fire department access, over one million dollars loss potential, potential fire spread is great, program impact is severe).

The Gamewell telegraph portions of the system are in excess of 25 years old. Maintenance is high, alarm information provided is limited, expansion is limited and costly. The telegraph system does not indicate when a field unit resets nor does it indicate when a local system is in trouble. Transferring the fire alarm from the Gamewell System to the new multiplexed system will satisfy DOE requirements and provide an easy expandable, economical alarm system.

10. Details of Cost Estimate

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 12% of construction costs, item b		$ 285
b. Construction costs		2,370
1. Sprinkler system installation into existing building (approximately 210,000 sq. ft. at $360/head)	$ 1,125	
2. 13 new water mains with trenching control valves and wet taps (approximately 1,200 feet at $90 per ft.)	219	
3. Connect sprinkler alarms into existing fire alarm system (15 risers at $8,400 each)	126	
4. Transfer fire alarm to new site protective signaling system (150 buildings at $6,000 each)	900	
Subtotal		2,655
c. Contingency at approximately 13% of above costs (Items a & b)		345
Total estimated cost		$ 3,000

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Fire protection improvements (phase II)
Brookhaven National Laboratory (BNL)
Upton, New York

2. Project No.: 86-R-726

11. Method of Performance

Design and inspection will be performed under one or more negotiated architect-engineer contracts with firms specializing in fire protection design. Construction and procurement will be accomplished by fixed-price contracts and purchase orders awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

Not required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not required.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
ENERGY MULTIPROGRAM LABORATORIES-GENERAL PURPOSE FACILITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Laboratory restoration I
Richland, Washington

2. Project No.: 87-R-751

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 4th Qtr. FY 1987

4. Date Construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: None

6. Current cost estimate: $ 2,100
Less amount for PE&D: 0
Net cost estimate: $ 2,100
Date: January 1986

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$ 2,100	$ 2,100	$ 2,100	$ 400
1988	0	0	0	1,690
1989	0	0	0	10

8. Brief Physical Description of Project

The existing first stage of two stages of air filtration in the radioactive ventilization exhaust system of a major 300 Area analytical chemistry facility uses disposable High Efficiency Particulate Air (HEPA) filters that are inserted into permanent, sheet-metal filter housings. The air that is being filtered is drawn from gloveboxes and hoods in which radioactive materials are used. This project will remove approximately 140 of the existing, obsolete filter housings and replace them with new support stands, ductwork, and instrumentation that will allow self-contained, disposable filter units to be used. The housings, ductwork and used filters removed by the project will be suitably packaged and disposed. The initial set of new, self-contained filters will be supplied by the project.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Laboratory restoration I
Richland, Washington

2. Project No.: 87-R-751

9. Purpose, Justification of Need for, and Scope of Project

The analytical chemistry facility is used for chemistry studies of radioactive materials. In order to comply with the release limits for radionuclides to the environment given in DOE Order 5480.1, Chapter XI, two stages of filtration must be provided for air exhausted from hoods and gloveboxes in which radioactive materials are used. The two stages satisfy the combined requirements for release limits and reliability during normal and accident conditions. This project, by replacing 140 obsolete filter housings, will complete replacement of all the first stage filters in the building with modern, air tight filter housings.

Over the life of the facility, virtually every radionuclide has been present in the gloveboxes and hoods served by the exhaust system that this project will modify. Large quantities of fissile materials, mixed fission products, and radioactive metal scrap (from reactor fuels) are routinely handled in the facility. The presence of these different radioactive materials, in significant quantities, requires that the ventilation system operate and be maintained in a very safe condition. Assuring that there is a high confidence level in the reliability of the system under both normal and accident conditions.

The existing filter housings are mechanically worn to the point that some are very difficult to seal. Air can leak between the filter and the frame, thus allowing contamination to spread into the duct work downstream from the filters. Then the filter is sealed properly, air is prevented from leaking past the filter and contamination is caught on the filter rather than being trapped downstream on the larger, secondary building filters. The seal problem is encountered both when new filters are installed and while filters are in service. At a given time, between 10% and 15% of the filters may fail to pass required performance tests. Loss of seal during operation reduces the effectiveness of the exhaust system, and may result in a release of contamination into downstream duct work between the primary and secondary filters. Correcting the seal problems results in decreased operating costs. The proposed system will assure total sealing and reduce filter changes by operations personnel to as low as reasonably achievable (ALARA) radiation exposure conditions, which is not possible with the existing housings.

The impact of not proceeding with this project will be to not allow operational and maintenance personnel to meet the ALARA radiation exposure. There would also be a higher potential for radioactive release from the building during an accident condition and the stoppage of all work in the building.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Laboratory restoration I Richland, Washington	2. Project No.: 87-R-751

9. Purpose, Justification of Need for, and Scope of Project (continued)

Because of many filter boxes, ventilation ducts, overhead piping and wire chases, the surface area on which contamination could be deposited is very large. A release of contaminated particles in the basement would be extremely difficult and expensive to clear up. With many of the past R&D programs processed in the building, costs could have gone into the million dollar range to restore proper conditions. This project will reduce that risk to something that is minimal when utilized with proper filter changing.

10. Details of Cost Estimate[a]

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 6% of construction costs, item b		$ 100
b. Construction costs		1,620
(1) Improvements to land	$ 0	
(2) Building services modifications	1,620	
(3) Utilities	0	
(4) Equipment	0	
c. Contingency at approximately 23% of above costs		380
Total estimated cost		$2,100

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[a] This estimate is based on 100% completion of conceptual design.

11. Method of Performance

Design and inspection will be performed by the onsite architect-engineer. Construction and procurement will be accomplished by the onsite cost plus award fee (CPAF) contractor for the radioactive work.

12. Funding Schedule of Project and Other Related Funding Requirements

Not required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not required.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMEN
MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES PROGRAM
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Piping system restoration
Oak Ridge National Laboratory,
Oak Ridge, Tennessee

2. Project No.: 87-R-752

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3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 1st Qtr. FY 1988

4. Date construction ends: 2nd Qtr. FY 1989

5. Previous cost estimate: None
Date: None

6. Current cost estimate: $3,800
Date: January 1985

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 3,800	$ 725	$ 725	$ 360
1988	0	3,075	3,075	1,855
1989	0	0	0	1,585

8. Brief Physical Description of Project

This project contains three parts:

- The replacement, refurbishment, or upgrading of unreliable or overloaded utility piping distribution systems currently serving Oak Ridge National Laboratory (ORNL) facilities located in the Y-12 Plant. The outdated piping distribution systems included in the project are no longer efficiently repaired. They include steam, cooling-tower water, and demineralized water. In addition to pipe replacement, valves, filters, pumps, and motors will also be replaced.
- The addition of a demineralizer and feed water charcoal filter to the central demineralized water system in order to provide a continuous supply of demineralized water adequate to meet ORNL at Y-12 requirements.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Piping system restoration
Oak Ridge National Laboratory,
Oak Ridge, Tennessee

2. Project No.: 87-R-752

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8. Brief Physical Description of Project (continued)

- The installation of a new air compressor and dryer with a capacity of 3,000 cubic feet per minute (cfm) in the central instrument air system to provide air to critical operations. This unit is needed to meet existing requirements of ORNL at Y-12.

9. Purpose, Justification of Need for, and Scope of Project

The purpose of this project is to restore two critical utilities supporting ORNL at Y-12 to an appropriate level of reliability and capacity, thus minimizing the adverse consequences of potential system failures or curtailments on research activities.

ORNL at Y-12 facilities are supplied utility services from central systems operated by the Y-12 Utilities Department. These systems consist of many pieces of equipment and distribution networks that predate ORNL's presence in Y-12. As such, the systems were installed and maintained primarily in support of weapon component production. ORNL facilities have been provided these utility services because the ORNL divisions occupy buildings that formerly housed weapons-related activities. Relatively few ORNL capital or programmatic funds have been spent to expand or renovate the distribution networks, to enlarge system capacity, or to replace worn or obsolete equipment.

Since 1980, the Y-12 Plant has been systematically replacing several worn or unreliable pieces of equipment, including compressors that supply the central systems. However, this replacement has occurred almost exclusively in the portion of Y-12 dedicated to weapons components production. Old compressors in the ORNL portion of the plant are not currently scheduled for replacement.

Two systems of specific interest, instrument air and demineralized water, are structured so that the two areas which they serve can be separated. In emergency situations, demineralized water can be totally shut off to ORNL facilities, and the instrument air distribution network valves so ORNL facilities will be solely dependent on an inadequate, 30-year-old compressor.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Piping system restoration
Oak Ridge National Laboratory,
Oak Ridge, Tennessee

2. Project No.: 87-R-752

9. Purpose, Justification of Need for, and Scope of Project (continued)

The demineralized water system currently is being upgraded by the Y-12 Plant to a 200-gallon-per-minute (gpm) production rate. However, backup capacity during demineralizer regeneration is only 100 gpm. The 200 gpm will supply both Y-12 and ORNL facility requirements, but 100 gpm will not. During regeneration of the primary demineralizer, it is to be expected that demineralized water to ORNL facilities will, on occasions, be curtailed. Depending on the type of feed water used (condensate, softened water, or process water), regeneration can occur as often as once a day using process water or once every 4 to 6 days using softened water. The Biology, Fusion Energy, and Engineering Technology divisions, and the Isotope Enrichment Group of the Operations Division use demineralized water in various experimental and operational activities. A prolonged shutdown of demineralized water would have a significant negative impact on all four divisions.

The proposed demineralizer (100-gpm capacity) will be installed in the central demineralized water plant to ensure a continuous 200-gpm production rate. It is vital to ORNL research objectives that the proposed demineralizer and filter be installed to ensure a reliable supply of demineralized water.

The instrument air compressors being replaced by Y-12 are in the production portion of the plant. The new units are sized only to meet production requirements and do not include capacity for ORNL facilities. Despite this replacement program, the newly defined instrument air requirements and the continued existence of several old and unreliable compressors makes doubtful a secure supply of instrument air unless ORNL invests in the system capacity.

The reciprocating compressor to be replaced has a nominal 1,500 cfm capacity. As is typical of a reciprocating-type compressor of its age, this compressor needs an extensive annual overhaul to prolong its life. Immediately after the overhaul, the compressor produces 1,500 cfm; but in a period of about 2 months, this capacity deteriorates to approximately 1,000 cfm.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Piping system restoration
Oak Ridge National Laboratory,
Oak Ridge, Tennessee

2. Project No.: 87-R-752

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9. Purpose, Justification of Need for, and Scope of Project (continued)

ORNL facilities require approximately 3,000 cfm, and the new compressor is sized to meet this requirements. Only by investing in a new compressor of this size can ORNL ensure a reliable and adequate supply of instrument air. The integration of this instrument air into research and production activities by using in pneumatic control systems, equipment operation, cooling, test and inspection, and various support activities makes the installation of this new compressor vital to the accomplishment of ORNL objectives.

Based on engineering assessments, the continued operation of laboratory facilities is vulnerable to other unreliable utility piping distribution systems that have not been systematically upgraded since their installation in the 1940's. Though recognized as an urgent need, the work has not been possible, except on a piecemeal basis, under prevailing budget limitations. Renovations and upgrading of the utility piping distribution systems will enhance the inherent capability of these facilities over the long term. Systems that can be categorized as unreliable include the tower-water distribution and recirculating-demineralized water distribution systems serving the Isotope Separations building. These systems date back to the mid-1940's. Since that time, upgrading has occurred through routine or emergency maintenance. Valve gates have rusted and no longer seal. Filters have deteriorated such that internal element supports are not functional.

A major steam-control station providing process and heating steam to the Fusion Energy Administration and Laboratory facility does not provide adequate control and experiences frequent outages requiring much maintenance. Recirculating-demineralized water pumps serving the Fusion Energy and Engineering Technology building are about 30 years old and require expensive, time-consuming repairs because replacement parts are no longer available and must be shop fabricated.

The utility systems serving ORNL at Y-12 cannot be considered as separate systems from the Y-12 utility system. The systems were installed in the 1940's as continuous systems designed to serve the site as a whole. In the portion of Y-12 not occupied by ORNL, the system's condition reached the critical point in FY 1979, and refurbishment was approved starting in FY 1980. The same risks apply to these ORNL facilities within Y-12, which were constructed during the same time period.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Piping system restoration
Oak Ridge National Laboratory,
Oak Ridge, Tennessee

2. Project No.: 87-R-752

9. Purpose Justification of Need for, and Scope of Project (continued)

Considering the importance of the research programs and the magnitude of the total investment, it is important that the reliability of piped utility services for these facilities be restored to original status and, in many cases, modified to accommodate current levels of use.

10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 15% of construction costs, item b		$ 401
b. Construction costs		2,756
(1) 4000 building modifications	$ 684	
(2) Special facilities	2,072	
Subtotal		3,157
c. Contingency at approximately 20% of above costs		643
Total estimated costs		$ 3,800

11. Method of Performance

Design and inspection will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

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*The above estimate is based on a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Piping system restoration
Oak Ridge National Laboratory,
Oak Ridge, Tennessee

2. Project No.: 87-R-752

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12. Funding Schedule of Project Funding and Other Related Funding Requirements

Not required; total estimated cost is less than $5,000,000.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not required.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES PROGRAM
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Rehabilitate laboratory space
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-753

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 1st Qtr. FY 1988

4. Date construction ends: 3rd Qtr. FY 1990

5. Previous cost estimate: None
Date: None

6. Current cost estimate: $ 12,035
Less amount for PE&D: 0
Net cost estimate: $ 12,035
Date: January 1986

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$ 12,035	$ 1,235	$ 1,235	$ 1,235
1988	0	3,600	3,600	2,000
1989	0	3,600	3,600	4,100
1990	0	3,600	3,600	4,700

8. Brief Physical Description of Project

This project is the first phase of a two phase project that will rehabilitate a large multipurpose laboratory and office building at ANL (Building 200). The 359,600 gross square feet brick structure was put into service in 1951 and has a replacement value of $86,100,000 and an expended useful life of 60%. Phase I will rehabilitate wings A-F, which totals 166,000 gross square feet of space. The remainder of the building will be renovated in phase II.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Rehabilitate laboratory space Argonne National Laboratory (ANL) Argonne, Illinois	2. Project No.:	87-R-753

8. Brief Physical Description of Project (cont'd.)

The workscope will encompass essentially all aspects of building construction, except structure and roofing[1], including (as needed): building envelope (windows, tuckpointing); building interiors (painting, partition, floor tile, ceiling tile); electrical main distribution systems (transformers, switchgear, wiring); lighting (panels, fixtures, wiring), heating ventilation and air conditioning (HVAC) (pumps, fans, filters, coils, heat exchangers, air compressors, controls, ductwork, piping[2]); plumbing (toilet fixtures, water heaters, pumps, water and drain piping); laboratory and process piping (water heaters, distilled water system, air compressors and driers, nitrogen and oxygen storage tanks and evaporators, gas, water and drain piping); elevators (hydraulics controls cabs); removal and disposal of potentially contaminated or hazardous materials such as exhaust ductwork, laboratory drain piping and asbestos insulation.

9. Purpose, Justification of Need for, and Scope of Project

By the time this project is funded, the building will have been in constant use as a major laboratory and office building for more than 35 years. The needs of scientific programs have changed dramatically in this time period. The facility does not meet current construction codes and safety standards. In addition, systems that provide electric power, process fluids, heating, cooling, humidity control, clean air delivery and laboratory exhaust for control of hazardous materials are becoming less reliable each year because of aging. Adequate maintenance is difficult and very costly because replacement parts for many of the components are no longer available and shop effort is required for temporary repairs.

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[1] Included under on-going Project No. 85-R-702 "Replace Laboratory Roofs".

[2] Chillers and cooling towers are included under Project No. 85-R-709 "Central Chilled Water System "Phase I".

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Rehabilitate laboratory space
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-753

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9. Purpose, Justification of Need for, and Scope of Project (cont'd)

The need exists, therefore, for a total upgrade of the building as described in the work scope above. If this facility upgrade is not supported, maintenance effort to keep the facility in an operational condition can be expected to continuously increase. Shutdowns due to major building equipment failures can be expected to cause major interruptions in current and future R & D activities and require long term experiments to start again. Health, safety, security and environmental risks will continue to increase. Personnel morale and productivity are also likely to be adversely affected.

10. Details of Cost Estimate*:

	Total Cost
a. Engineering, design, and inspection at approximately 17% of construction costs, item b	$ 1,530
b. Construction costs	9,000
c. Contingency at approximately 14% of above costs	1,505
Total estimated cost	$ 12,035

*Based upon a completed conceptual design and current cost data.

11. Method of Performance

Engineering, design and inspection will be performed by Laboratory engineering personnel, aided by outside A/E firms. Construction will be accomplished by fixed-price contract awarded specializing in fire protection design. Construction and procurement will be accomplished by fixed-price contracts and purchase orders awarded on the basis of competitive bidding.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Rehabilitate laboratory space
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-753

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12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project costs						
1. Total facility costs						
(a) Construction line item	$ 0	$ 1,235	$ 2,000	$ 4,100	$ 4,700	$12,035
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total direct costs	$ 0	$ 1,235	$ 2,000	$ 4,100	$ 4,700	$12,035
2. Other project costs						
(a) R&D necessary to complete construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Other project related costs	51	0	0	0	0	51
Total other project costs	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Total project costs (Item 1 and 2) .	$ 51	$ 1,235	$ 2,000	$ 4,100	$ 4,700	$12,086

b. Other related annual costs (estimated life of project: 20 years

1. Facility operating costs	$ 0
2. Activity operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to programmatic effort in the facility...........................	0
5. Other costs	0
Total related annual costs..	0

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate laboratory space
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-753

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
  1. Total facility
    (a) Construction line item - No narrative required
    (b) PE&D - None
    (c) Expense funded equipment - None
    (d) Inventories - None
  2. Other project funding
    (a) No R&D effort is required
    (b) $51,000 spent for conceptual design

b. Other related funding requirements

1. Facility operating costs - Rehabilitation of this facility will increase energy efficiency and greatly lower operating costs, thus the facility operating cost is given as zero.

2. Activity operating expenses directly related to the facility - There is no activity operating expense directly related to, or required for support of this project, thus the activity operating expense is given as zero.

3. There is no capital equipment related to the activity effort, not related to construction.

4. GPP or other construction related to activity effort - None

5. Other costs - None

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MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES PROGRAM
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Mechanical systems rehabilitation
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-755

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 4th Qtr. FY 1987

4. Date construction ends: 1st Qtr. FY 1989

5. Previous cost estimate: None
Date: None

6. Current cost estimate: $ 3,200
Less amount for PE&D: 0
Net cost estimate: $ 3,200
Date: January 1986

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$ 3,200	$ 1,100	$ 1,100	$ 1,060
1988	0	2,100	2,100	1,590
1989	0	0	0	550

8. Brief Physical Description of Project

This project will restore worn parts of the central heating ventilation and air conditioning (HVAC) systems in three large office and laboratory buildings, Building 203, Building 205, and Building 212. Forty-three large field fabricated walk-in type air handling units require extensive rebuilding. These units range in size from 8,000 to 30,000 cfm (each roughly 25 to 75 tons of refrigeration capacity). Each provides ventilation air and climate control to a large bank of experimental laboratories and their adjacent offices. Required work is as follows:

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Mechanical systems rehabilitation
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-755

8. Brief Physical Description of Project (cont'd.)

Chilled Water Coils: The air handling units selected for overhaul are those with steel coil frames rusted through. The frames no longer support the coils, nor do they prevent untreated air from bypassing the coils. Replacement entails providing adjacent coil blank-off panels, new local piping, and vapor-proof exterior insulation over the new parts.

Preheat Coils: This project will replace all preheat coils in the selected air-handling units with glycol-filled coils. The existing steam coils require replacing because of corroded frames. The poor performance of the aged steam coils and the resulting downstream damage to the systems makes renovation with new technology urgent. Replacement must include new coil supports, steam-to-glycol heat exchangers at selected locations, appropriate changes in the control hardware, new local piping and associated pipe insulation.

Filters: Replacement of selected filter banks within the air handling units is included in the project scope. Those selected for replacement are located downstream of the coils they are intended to protect. Their location and rusted condition have made them maintenance liabilities, and their low-tech filtering efficiency is no longer adequate for the scientific programs which rely on them. Replacement must include current-technology automatic 85% efficiency filters, appropriate sheet metal modifications to accommodate the change, some modifications of electrical conduit and wiring, and associated monitoring instruments.

Sheet Metal: Sheet metal parts downstream of the cooling coils will be replaced. They are corroded from moisture carry-over. Coil drain pans, metal floors and the lower parts of the housings require repair or replacement to maintain airtightness. Upstream portions of the housings are generally in good condition and represent a considerable asset compared with the cost of all-new air handling assemblies.

Controls: Existing 3-way chilled water control valves are worn obsolete types. They will be replaced with energy-efficient 2-way valves. Associated control components of obsolete manufacture and poor parts availability have been marked for replacement.

Painting: All exposed new work will be painting.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Mechanical systems rehabilitation
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-755

8. Brief Physical Description of Project (cont'd.)

Packaged Units: In addition, six packaged air conditioning units deemed to be rusted beyond reasonable repair will be replaced in total. Eight other salvageable packaged units will be equipped with glycol preheat coils and rusted filter sections will be replaced.

9. Purpose, Justification of Need for, and Scope of Project

The three buildings in question are large permanent brick laboratory-office buildings, each housing from 200 to 340 people and serving important scientific research programs such as the tandem-linac, battery development, laser projects, basic energy sciences and nuclear energy studies. The mechanical components providing the essential ambiance control for the scientists are from 25 to over 30 years old and have served their normal useful lives (20 to 25 years is average, according to DOE Life Cycle Costing guidelines). Cooling, humidity control, and clean air delivery are no longer reliable. Large scale unprecedented low chilled water flows in these buildings have been traced to unreliable preheat performance, in turn causing downstream coil freezing, frequent system drainage, extraordinary pipe corrosion, and widespread clogging of small water passages. Correction is urgent.

The air systems included in this project comprise approximately one-half of the total units for the three buildings. Units that can be temporarily restored by strategic coil replacement and those units showing little deterioration have not been included in this list and will be assigned for future attention when required.

The extent of so much simultaneous use and aging carries the scope of renewal beyond available operating funds; capital funding is required. Because of the close inter-relation of components it is more cost effective to completely rebuild each central unit instead of replacing parts piecemeal. The one obvious alternative of abandoning these failing systems amounts to an unreasonable condemnation of large investments in otherwise very high quality permanent research facilities. A second alternative of buying all new air handling facilities is undesirable from a research-interruption viewpoint and is considered unnecessarily expensive. The third known alternative, of piecemeal parts replacement is the one now in use. Proper use of operating funds under acceptable accounting procedures limits both the character and the extent of permissible renovation. The result of this alternative is marginal reliability and poor return for effort and expense.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Mechanical systems rehabilitation
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-755

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9. Purpose, Justification of Need for, and Scope of Project (cont'd.)

Thoughtful preplanning of rebuilding offers opportunities to use current technology to improve reliability (glycol preheat) and save energy (2-way control valves and improved control cycles). Overall, the project will release operating people from intensive breakdown maintenance and allow a return to more reasonable maintenance planning for the units involved.

10. Details of Cost Estimate*:

	Item Cost	Total Cost
a. Engineering, design, and inspection at 15% of construction costs, item b............		$ 353
b. Construction costs..		2,373
c. Demolition and removal and debris..		59
Subtotal..		$ 2,785
d. Contingency at 15% of above costs..		415
Total estimated costs...		$ 3,200

11. Method of Performance

Design and inspection will be performed by ANL personnel assisted by outside engineering services. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

*Based upon a completed conceptual design and current cost data.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Mechanical systems rehabilitation
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-755

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12. Funding Schedule of Project Funding and Other Related Funding Requirements

Not required, TEC is less than $5,000,000.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not required.

DEPARTMENT OF ENERGY
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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES PROGRAM
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Water line replacement
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-756

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 1st Qtr. FY 1988

4. Date construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: None
Date: None

6. Current cost estimate: $ 5,200
Less amount for PE&D: 0
Net cost estimate: $ 5,200
Date: January 1986

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$ 5,200	$ 1,000	$ 1,000	$ 400
1988	0	2,000	2,000	2,100
1989	0	2,200	2,200	2,700

8. Brief Physical Description of Project

This project will rehabilitate all of the deteriorated water lines which serve permanent buildings and areas at Argonne National Laboratory (ANL). Approximately 18 miles of cast iron water line in the size range of 2 inches to 18 inches will be replaced. The new water lines will consist of polyvinyl chloride (PVC) and reinforced concrete pipe (RCP) approved for potable water distribution and cast iron valves and fittings with cathodic protection.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Water line replacement
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-756

9. Purpose, Justification of Need for, and Scope of Project

This project is proposed because the water lines at ANL will become unreliable for fire protection use and Laboratory operations by 1990. Replacement of the water line will restore the reliability necessary for fire safety and efficient Laboratory operations.

Due to soil-side corrosion and graphitization of the cast iron pipe (determined by metallographic analysis), the water lines have reached the end of their useful life in most sections. The water lines will experience pipe breaks at an increasing rate as they age and are subjected to changes in stress caused by temperature changes or nearby excavation. The high frequency of pipe breaks will result in water supply outages to major buildings for two reasons: 1) increased number of simultaneous pipe breaks so that buildings with water supply from two directions in the grid will have both supplies cut off; 2) the cast iron pipe has become so weak that it cannot be repaired with a sleeve and replacement of an entire section typically requires one week.

The history of pipe breaks of the potable water system at ANL was analyzed by a corrosion consultant , C. P. Dillion and Associates, in 1979. The frequency of pipe breaks follow a semilogarithmic curve typical of corrosion and aging in case iron pipe. Over 100 pipe breaks per year are projected to occur in 1986 and beyond. Projections to 1983 have proven accurate. By 1990 the fire distribution system will not supply water reliably for fire protection use.

The Laboratory has three water distribution systems: a) domestic/fire (14.8 miles), b) laboratory (3.3 miles), c) canal (5.5 miles). The majority of the domestic/fire and laboratory water lines were installed in 1950; the canal water lines were installed in 1963. Since the laboratory and canal water lines run parallel to the fire/domestic lines in most areas, replacing all three lines simultaneously is economical. Although the canal lines are only 20 years old, they have become heavily scaled and no longer deliver the rated volume of water. During the summer, several buildings are not supplied with sufficient cooling water requiring supplemental feed from the domestic/fire system. In 1980, acid cleaning of the canal lines was investigated by a commercial firm; acid cleaning on a test sample failed to remove the scale safely. Replacement of the canal lines will return the canal system to its rated capacity. Since 1983, the canal water treatment has been modified so that in the future treatment water will no longer scale the lines.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Water line replacement
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-756

9. Purpose, Justification of Need for, and Scope of Project (cont'd.)

Scope of Project: This project will replace 11.1 miles of domestic/fire, 2.9 miles of laboratory and 4.4 miles of canal water lines. The remaining portions of the existing water lines either serve buildings planned for demolition or will have been rehabilitated with funding currently in the Fire Safety Improvements Line Item.

Alternatives to cast iron pipe were investigated. PVC pipe was chosen for its low cost and high corrosion resistance. The new PVC pipe will withstand the corrosiveness of the soil. Cast iron valves and fittings will be provided with sacrificial anodes for cathodic protection. This project will reduce the frequency of water line breaks due to the deteriorated cast iron pipe. The beneficial results are: a) reliability of fire protection water for property and life safety and b) reliability of laboratory and canal water distribution for Laboratory programs.

10. Details of Cost Estimate*:

	Item Cost	Total Cost
a. Engineering, design, and inspection at 13% of construction costs, item b		$ 530
b. Construction costs		4,180
(1) Site work	0	
(2) Buildings	0	
(3) Utilities	$ 4,180	
Subtotal		$ 4,710
c. Contingency at 10% above costs		490
Total estimated costs		$ 5,200

*Based upon a completed conceptual design and current cost data.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Water line replacement
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-756

11. Method of Performance

Engineering and design will be accomplished by an architect engineer under Laboratory supervision. Construction inspection will be accomplished by Laboratory personnel. Construction will be accomplished via lump-sum, competitively bid construction contract.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project cost					
1. Total costs					
(a) Construction line item...............	$ 0	$ 400	$ 2,100	$ 2,700	$ 5,200
(b) PE&D.................................	0	0	0	0	0
(c) Expense funded equipment.............	0	0	0	0	0
(d) Inventories..........................	0	0	0	0	0
Total direct costs.......................	$ 0	$ 400	$ 2,100	$ 2,700	$ 5,200
2. Other project costs					
(a) R&D necessary to complete construction......................	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Other project related costs..........	8	0	0	0	8
Total other project costs............	$ 8	$ 0	$ 0	$ 0	$ 8
Total project costs (Item 1 and 2)...	$ 8	$ 400	$ 2,100	$ 2,700	$ 5,208

b. Other related funding requirements	
1. Facility operating costs..	0
2. Activity operating expenses directly related to the facility................................	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility..	0
4. GPP or other construction related to programmatic effort in the facility..................	0
5. Other costs...	0
Total related annual costs..	0

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Water line replacement
Argonne National Laboratory (ANL)
Argonne, Illinois

2. Project No.: 87-R-756

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
  1. Total facility costs
    (a) Construction line item - No narrative required
    (b) PE&D - None
    (c) Expense funded equipment - None
    (d) Inventories - None
  2. Other project funding
    (a) No R & D effort is required
    (b) $8,000 for conceptual design

b. Total related funding requirements

The water lines will have a useful lifetime longer than 30 years.

1. Facility operating costs - Implementation of this project will replace existing water lines. This will result in a reduction of maintenance to repair pipe breaks, and restore an acceptable level of operational efficiency to existing facilities. Thus the facility operating cost is reported as zero.

2. Operating expenses directly related to the facility - Programmatic although this project will restore and replace general purpose facilities employed to perform a wide variety of activities, there is no activity operating expense directly related to, or required for support of this project, thus the activity operating expense is reported as zero.

3. Capital equipment not related to construction but related to the activity effort in the facility - None

4. GPP or other construction related to activity effort - None

5. Other costs - None

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MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES PROGRAM

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Electrical system rehabilitation
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-757

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3. Date A-E work initiated: 2nd Qtr. FY 1987

3a. Date physical construction starts: 3rd Qtr. FY 1988

4. Date construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: None
Date: None

6. Current cost estimate: $ 2,600
Less amount for PE&D: 0
Net cost estimate: $ 2,600
Date: January 1986

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7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$ 2,600	$ 300	$ 300	$ 140
1988	0	2,300	2,300	1,780
1989	0	0	0	680

8. Brief Physical Description of Project

This project is the first of several elements to improve the reliability of the electrical distribution system for the entire Laboratory.

This project will rehabilitate the 12kV main substation of Lawrence Berkeley Laboratory's (LBL) power distribution system. LBL's main substation is located on the upper hill area and distributes 28 Megawatts peak power to area substations through a 12.46 kV primary distribution system. The main substation is served by Pacific Gas and Electric (PG&E) through two 115kV/12.46kV transformers with 20 MVA and 30 MVA capacity. The main substation switchgear is arranged in split bus configuration, each bus connecting directly to PG&E switches. Each bus consists of three feeder breakers. A metal enclosed tie switch provides for connection of the two bus systems. The rehabilitation of the main substation will include the replacement of the existing substandard circuit breakers and addition of incoming, tie and feeder circuit breakers. The project provides also for addition of an air switch assembly consisting of feeder and tie switches. The project will utilize the existing substation site with the following structural modifications:

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Electrical system rehabilitation
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-757

8. Brief Physical Description of Project (cont'd.)

- Increase of substation floor space by 600 square feet.
- Extension of existing underground cable vault by 11 feet.
- Construction of retaining walls, up-ramp and stairs for elevated floor section.

The following major items comprise the scope of this project:

1. Replace six existing air circuit breakers with power vacuum circuit breakers.
2. Add three incoming line breakers to the 12kV buses.
3. Replace one existing tie switch between Bus 1 and 2 with a full capacity circuit breaker.
4. Add four feeder breakers to Bus 1 and 3 feeder breakers to Bus 2.
5. Add air switch assembly consisting of 6 feeders and one tie load interrupter switch.
6. Install data acquisition system and communications unit for remote control indication and metering.
7. Perform a power system study determining short circuit levels and protective device coordination.

These new government-owned facilities or improvements will be located on leased land owned by the Regents of the University of California.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Electrical system rehabilitation Lawrence Berkeley Laboratory Berkeley, California	2. Project No.: 87-R-757

9. Purpose, Justification of Need for, and Scope of Project

This project will correct existing deficiencies at the 12kV main substation, which feeds the area substations of the entire Laboratory. The project will upgrade the substation to current National Electrical Code (NEC) safety requirements and provide for improvement in reliability and maintainability. The project will permit LBL to take advantage of favorable electric rate schedules by providing access to reduced cost interruptible power or higher cost firm power to all Laboratory facilities. The project will fully provide for present and long range power distribution requirements at LBL's main substation.

The existing 12kV main substation does not meet the Laboratory's operating requirements for the following reasons:

1. The existing substation equipment is aged, substandard, and hazardous;
2. The existing bus configuration does not permit LBL to isolate utility incoming lines and bus sections without cooperation from the utility and prior operation of their switchgear.
3. The tie switch in the switchgear assembly is underrated and unsafe to operate without cooperation from the utility company and prior operation of their switches.
4. The existing switchgear has insufficient circuit breakers requiring doubling of outgoing feeders and direct connection of outgoing feeders to the main bus.
5. The minimum space requirements stipulated by the National Electric Code for safe operation and maintenance are not complied with.

The above deficiencies have resulted in the following operational difficulties:

- Incoming line power failure on one supply line requires public utility switching prior to LBL's closing tie switch and restoring service. This results in extensive response time and long power outages.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Electrical system rehabilitation
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-757

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

- Maintenance on switchgear is only performed when power outage occurs. The switchgear construction is such that safe maintenance can only be performed with line and load side de-energized. The line sides can only be de-energized by public utility switching, which occurs at infrequent intervals.

- Utilization of cost economic power source is not always possible. The existing number of feeder breakers is insufficient to provide dual sources to all users for most economic power rate selection.

- Decreased reliability in dual connected supply feeders due to circuit breaker tripping caused by failure in one feeder line and affecting service in the other line.

10. Details of Cost Estimate*:

	Item Cost	Total Cost
a. Engineering, design, and inspection at about 15% of construction costs, item b		$ 280
b. Construction costs		1,850
(1) Improvements to land	$ 130	
(2) Utilities	240	
(3) Special facilities engineered equipment	$ 1,480	
Subtotal		$ 2,130
c. Contingency at about 22% above costs		470
Total estimated costs		$ 2,600

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*Based upon a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Electrical system rehabilitation
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-757

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11. Method of Performance

Engineering design will be performed under a negotiated architect engineer subcontract. Inspection and some engineering will be done by LBL personnel. Construction and procurement will be accomplished by fixed price subcontracts awarded on the basis of competitive bids. At the time of scoping construction and procurement, specific parts of the project will be set aside for SBA 8A subcontracts. Candidate items are conduit placement, structural slab, cable splicing, fencing and landscaping.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

Not required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not required.

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MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES PROGRAM
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Rehabilitate Mechanical Utilities
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-758

3. Date A-E work initiated: 2nd Qtr. FY 1987

3a. Date physical construction starts: 3rd Qtr. FY 1988

4. Date construction ends: 4th Qtr. FY 1990

5. Previous cost estimate: None
Date: None

6. Current cost estimate: $ 5,500
Less amount for PE&D: 0
Net cost estimate: $ 5,500
Date: January 1986

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$ 5,500	$ 1,050	$ 1,050	$ 260
1988	0	3,000	3,000	1,100
1989	0	1,450	1,450	2,580
1990	0	0	0	1,560

8. Brief Physical Description of Project

Lawrence Berkeley Laboratory (LBL) was established over 40 years ago. Portions of the LBL utility systems have deteriorated to the point where maintenance costs have become excessive and service interruptions have become frequent. Most utility systems at LBL were constructed to meet the requirements of specific buildings and experimental programs.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate Mechanical Utilities
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-758

8. Brief Physical Description of Project (cont'd.)

The work proposed under this project will upgrade sections of systems that have been identified as having the most serious deficiencies.

Some examples of the mechanical utilities deficiencies to be addressed are:

1. The 4-inch domestic water main to Building 74 is badly damaged, and failure will jeopardize programs that utilize the animal colony. Piping cross connections have been made with the industrial water supply in violation of the Plumbing Code, and the 8-inch domestic water main form Shasta Reservoir is overstressed due to soil settlement - failure will greatly reduce flow to many Laboratory buildings.
2. The cooling tower at Building 88 is overloaded on hot days, and requires increased cooling capacity.
3. The central compressed air plant is not sufficiently reliable, and interruptions affect various program labwide that rely upon the central air supply.
4. Natural gas mains have exceeded expected life and leaks would result in fire and loss of life, hazards and interruptions to programs.

Proposed facilities will be designed to the latest codes and will use the most suitable types of materials and equipment. The design will provide for more reliable service, safer and more efficient operation, better access and backup capacity for critical features such as fire protection. New work will avoid wherever possible unstable areas on the site and will incorporate the best design and construction practices to mitigate unfavorable site conditions when these areas cannot be bypassed. Timely construction of the proposed work will prevent future breakdowns that could be hazardous, that could disrupt vital LBL functions, and that could result in costly repairs to the old systems.

The improvements described herein will be made to existing government-owned facilities located on leased land owned by the Regents of the University of California.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate Mechanical Utilities
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-758

9. Purpose, Justification of Need for, and Scope of Project

The work proposed under this project is the upgrading and/or replacement of components of existing utility systems throughout the Lawrence Berkeley Laboratory site; this project will not completely rehabilitate the systems, but it will correct the more urgent and serious deficiencies. Much of the piping and equipment that comprise these systems has been in place for many years. Portions of the utilities have outlived their useful life, as evidenced by the repairs and piecemeal replacement that have been necessary to keep the systems in operation. Other portions of the systems, have become obsolete because of changing requirements. Still other sections of utilities have been constructed in areas of the site in which unstable or otherwise unfavorable soil conditions exist; the earlier systems constructed in these areas did not utilized materials and construction methods that are now available to offset the adverse natural conditions. Furthermore, safety standards, quality of materials, and construction techniques have changed over the years so that some of the facilities constructed in the 1940s, the 1950s, and even the 1960s are now substandard. In short, the age, the changing requirements for services, natural site conditions, and higher standards for safety and construction all have contributed to the deficiencies in the existing utility systems.

The rehabilitation of LBL site mechanical utilities has been planned to be phased in two separate projects scheduled for funding in FY 1987, Phase I, and in FY 1990, Phase II. The plan for phasing results from the need to mitigate program disruptions through careful sequencing of construction, to enhance the cost effectiveness of the work by improving the flexibility for change in the first phase, and, finally, to prioritize LBL's funding in relation to other urgent needs.

10. Details of Cost Estimate[a]:

	Total Cost
a. Engineering, design, and inspection at about 15% of construction costs...............	$ 600
b. Construction costs...	3,900
Subtotal..	$ 4,500
c. Contingency at about 22% above costs..	1,000
Total estimated costs..	$ 5,500

[a] Based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate Mechanical Utilities
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-758

11. Method of Performance

Engineering design will be performed under a negotiated architect engineer subcontract. Inspection, some engineering and some construction will be accomplished by LBL engineering staff. Construction and procurement will be accomplished by fixed price subcontracts awarded on the basis of competitive bids. At the time of scoping construction and procurement, specific parts of the project will be set aside for Small Business Administration 8A subcontracts. Candidate items are painting and labeling air and propane equipment and piping associated with upgrading the compressor plant and the propane plant.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project costs						
1. Total facility costs						
(a) Construction line item.......	$ 0	$ 260	$ 1,100	$ 2,580	$ 1,560	$ 5,500
(b) CP&D..........................	0	0	0	0	0	0
(c) Expense funded equipment.....	0	0	0	0	0	0
(d) Inventories..................	0	0	0	0	0	0
Total direct costs...........	$ 0	$ 260	$ 1,100	$ 2,580	$ 1,560	$ 5,500
2. Other project costs						
(a) R&D necessary to complete construction................	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Other project related costs..	0	0	0	0	0	0
Total other project costs....	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Total project costs (Items 1 & 2)...............	$ 0	$ 260	$ 1,100	$ 2,580	$ 1,560	$ 5,500

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Rehabilitate Mechanical Utilities
Lawrence Berkeley Laboratory
Berkeley, California

2. Project No.: 87-R-758

b. Total related annual costs (50 years)

1.	Facility operating costs	$ 0
2.	Programmatic operating expenses directly related to the facility	0
3.	Capital equipment not related to construction but related to the programmatic effort in the facility	0
4.	GPP or other construction related to programmatic effort in the facility	0
5.	Other costs	0
	Total other related annual funding costs	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding

1. Total facility costs

(a) Construction line item - No narrative required
(b) CP&D - No narrative required
(c) Expense funded equipment - No narrative required
(d) Inventories - No narrative required

b. Total related funding requirements (Facility Program use est. 50 years).

1. Facility operating costs - No narrative required
2. Programmatic operating expenses - No narrative required
3. Capital equipment no related to construction - No narrative required
4. GPP or other construction - No narrative required
5. Other costs - No narrative required

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
MULTIPROGRAM ENERGY LABORATORIES - GENERAL PURPOSE FACILITIES PROGRAM
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Upgraded steam distribution system
Oak Ridge National Laboratory,
Oak Ridge, Tennessee

2. Project No.: 87-R-759

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 1st Qtr. FY 1988

4. Date construction ends: 4th Qtr. FY 1990

5. Previous cost estimate: None
Date: None

6. Current cost estimate: $6,800
Date: January 1986

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 6,800	$ 2,000	$ 2,000	$ 1,700
1988	0	4,800	4,800	2,600
1989	0	0	0	1,900
1990	0	0	0	600

8. Brief Physical Description of Project

This project will replace deteriorated portions of the Oak Ridge National Laboratory (ORNL) steam distribution system, predominantly in the eastern portion of ORNL, provide looping and isolation valves to improve system reliability and maintainability, and provide condensate return lines as appropriate. Concurrently, deteriorated air lines paralleling the stream distribution system will be replaced.

9. Purpose, Justification of Need for, and Scope of Project

The ORNL steam distribution was originally built in the early 1940's and was modified and expanded through the years. Much of the underground piping has been in service for more than 30 years and is approaching the end of its expected life.

1. Title and location of project: Upgraded steam distribution system
Oak Ridge National Laboratory,
Oak Ridge, Tennessee

2. Project No.: 87-R-759

9. Purpose, Justification of Need for, and Scope of Project (continued)

Recent failures in the steel conduit and bellows expansion joints have resulted in major emergency repairs. A $400,000 emergency General Plant Project (GPP) was completed in FY 1984 to repair a deteriorated bellows expansion joint and replace steam and parallel air lines. In addition to the energy loss, this expansion joint failure was a safety hazard to personnel in the vicinity. Because of these failures and anticipated future failures, a major portion of the buried steam system can no longer be considered reliable. These conclusions are based on an evaluation report by Energy Systems Engineering and further verified by measurements conducted in an Energy Division investigation.

Another $250,000 GPP was also completed in FY 1984 replacing sections of the underground mains to the 7,000 area with above ground lines. The previous underground line was in contact with groundwater and was experiencing excessive heat loss.

As the steam distribution system is presently configured, a single component failure such as a valve, distribution pipe, or expansion bellows, could result in a total system shutdown. Such a shutdown would impact millions of dollars worth of ongoing research experiments and related activities. Heavily used research facilities such as the Oak Ridge Electron Linear Accelerator and the Holifield Heavy Ion Research Facility would be shut down within 24 hours of loss of steam; while a program such as the Space Nuclear Project is susceptible to loss of up to 10 years of test data on long-term creep tests conducted in the High-Temperature Gas Cooled Reactor.

The upgraded system, in addition to improving reliability will allow most services to be continued in the event of line failure by providing steam through alternate routes provided by the added loops and isolation valves. The condensate return system will reduce the treated water and steam load output from the steam plant and hence operating costs.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Upgraded steam distribution system
Oak Ridge National Laboratory,
Oak Ridge, Tennessee

2. Project No.: 87-R-759

9. Purpose, Justification of Need for, and Scope of Project (continued)

In the aforementioned FY 1984 GPP, it was found that the air lines were deteriorated and rapidly approaching the end of their useful life; hence, concurrent with replacement of the steam lines, all deteriorated air lines will be replaced and provided with cathodic protection.

Alternatives to the proposed project are presented in a feasibility study dated February 1, 1984, prepared by an Architect-Engineer (A-E). The report included: (1) upgraded steam system; (2) low-temperature hot water system; and (3) high-temperature hot water system.

The first alternative - low-temperature hot water system - although offering operating savings through lowered energy consumption and maintenance costs, cannot economically support the significantly higher capital costs of installation including the necessary conversion of building heating systems from steam to hot water.

The second alternative - high-temperature hot water system - was quickly determined to be less cost-effective than the low-temperature hot water system as a result of even higher capital costs due to more expensive piping mandated by the use of higher pressures. Further, this option does not offer all of the advantages of the low-temperature system.

10. Details of Cost Estimate*

	Total Cost
a. Engineering, design, and inspection at approximately 18% of construction costs, item b	$ 908
b. Construction costs	4,997
Subtotal	5,905
c. Contingency at approximately 15% of above costs	895
Total estimated costs	$ 6,800

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*The cost estimate is based on a conceptual design report, completed in March 1984 at a cost of $130,000 and revised in February 1985.

1. Title and location of project: Upgraded steam distribution system
Oak Ridge National Laboratory,
Oak Ridge, Tennessee

2. Project No.: 87-R-759

11. Method of Performance

Design and inspection will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project costs						
1. Total facility costs						
(a) Construction line item	$ 0	$ 1,700	$ 2,600	$ 1,900	$ 600	$ 6,800
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total direct costs	$ 0	$ 1,700	$ 2,600	$ 1,900	$ 600	$ 6,800
2. Other project costs						
(a) R&D necessary to complete construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Other project-related costs	130	0	0	0	0	130
Total other project costs	$ 130	$ 0	$ 0	$ 0	$ 0	$ 130
Total project costs (Items 1 and 2)	$ 130	$ 1,700	$ 2,600	$ 1,900	$ 600	$ 6,930

b. Total related annual costs (estimated life: 20 years)	
1. Facility operating costs	$544
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to the programmatic effort in the facility	0
5. Other costs	0
Total related annual costs	$544

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Upgraded steam distribution system
Oak Ridge National Laboratory,
Oak Ridge, Tennessee

2. Project No.: 87-R-759

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13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
  1. Total facility costs
    (a) Construction line item - No narrative required
    (b) PE&D - No narrative required
    (c) Expense funded equipment - No narrative required
    (d) inventories - No narrative required
  2. Other project funding
    (a) R&D necessary to complete construction - No narrative required
    (b) Conceptual design costs - The conceptual design report was completed in March 1984 at a cost of approximately $130,000.

b. Total related funding requirement - The estimated useful life of the Upgraded Steam System is 20 years.
  1. Facility operating costs

  These are the estimated costs pertaining to the east end distribution system and building piping systems. They include the energy losses of the distribution, building and condensate return systems due to conduction, trap loss, pit flooding and leakage. They also include maintenance costs for all the piping as well as the pumping costs of the condensate return.
  2. Programmatic operating expenses directly related to the facility - No narrative required
  3. Capital equipment not related to construction but related to the programmatic effort in the facility - No narrative required
  4. GPP or other construction related to the programmatic effort in the facility - No narrative required

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
ENVIRONMENTAL COMPLIANCE UPGRADE
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Non-radiological process waste treatment project
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 86-R-801

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3. Date A-E work initiated: 1st Qtr. FY 1986

3a. Date physical construction starts: 3rd Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: 3,000*
Date: December 1984

6. Current cost estimate: $18,000
Less FY 1984 PE&D: 0
Net cost estimate $18,000
Date: September 1985

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$ 3,000	$ 2,887	$ 2,887	$ 1,587
1987	15,000	7,000	7,000	5,000
1988	0	8,113	8,113	7,113
1989	0	0	0	4,300

8. Brief Physical Description of Project

A Non-Radiological Wastewater Treatment Project (NRWTP) is proposed for the Oak Ridge National Laboratory (ORNL) that will address regulatory environmental compliance concerns. Among these concerns are certain non-radiological process waste streams which are currently discharged untreated into area creeks and the active use of surface impoundments for process wastewater. This project proposes to modify process systems (eliminate nitric acid regeneration of demineralizers) and to collect and treat these streams as required to meet discharge parameters as established by the Environmental Protection Agency (EPA) and the State of Tennessee and to eliminate the discharge of hazardous wastewater into surface impoundments. The NRWTP will provide required collection, treatment, and monitoring facilities based on wastewater characterization and treatability studies to meet effluent criteria established by regulatory agencies.

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*Previous cost estimate of $3,000,000 provided for Title I and II engineering design FY 1986.

1. Title and location of project: Non-radiological process waste treatment project
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 86-R-801

8. Brief Physical Description of Project (continued)

Physical construction will include pumps, tanks, and piping to transfer wastewater to treatment facilities, tankage to replace surface impoundments process modification (replacement of nitric acid demineralizer regeneration systems) to reduce pollutant loading, special equipment to accomplish the desired handling and treatment of wastewater and resultant solid waste, computerized monitoring and control equipment, and new buildings to house equipment and support facilities.

9. Purpose, Justification of Need for, and Scope of Project

The purposes of this project are to resolve the major Clean Water Act concerns at ORNL with respect to the discharge of nonradiological process wastewater and to eliminate the discharge of hazardous wastewater into surface impoundments by November 8, 1988, in compliance with provisions of the reauthorized Resource Conservation and Recovery Act (RCRA). Current liquid effluents are not in compliance with the Clean Water Act and the Tennessee Water Quality Act. The National Pollutant Discharge Elimination System (NPDES) permit issued by the EPA and state will identify new monitoring and effluent points and discharge limits. The permit will require that all process wastewater be treated. This project will provide treatment which will ensure ORNL's compliance with discharge parameters. The project will also provide tankage to eliminate the discharge of process wastewater into surface impoundments. Cleanup of these impoundments will be provided under other projects.

The proposed project will treat the effluent streams from ORNL facilities including the Process Waste Treatment Plant (Building 3544), Central Research and Administration (4500 Area), Environmental Sciences Laboratory (Building 1505), Radioisotope Production Laboratories (3000 Area, non-radiological effluents), various flows from Melton Valley (High-Flux Isotope Reactor and the Transuranium Processing Plant, non-radiological effluents), and other waste streams.

Considered a major stream, the effluent from Building 3544, is currently being treated by ion exchange to remove only radioactivity but has exceeded NPDES limits in several parameters (dissolved solids, chemical oxygen demand (COD), and nitrates). Other streams are not currently treated and surpass the NPDES requirements and must be treated. The current waste treatment plant (Building 3544), even with modifications, does not have the capability to treat all exceeded parameters, and is designed for a lower feed rate than will be required to treat the combined feed streams. Therefore, it is necessary to build a new wastewater treatment system with the capability to treat these streams.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Non-radiological process waste treatment project
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 86-R-801

10. Details of Cost Estimate

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 24%* of construction costs, item b		$ 2,700
b. Construction costs		11,280
(1) Land improvements	$ 250	
(2) New buildings	605	
(3) Special facilities	9,420	
(4) Outside utilities	1,005	
Subtotal		13,980
c. Contingency at approximately 29% of above costs		4,020
Total estimated cost		$ 18,000

*This estimate is from the Conceptual Design Report completed in May 1985.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Non-radiological process
waste treatment project
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 86-R-801

---

11. Method of Performance

Design and inspection will be performed under negotiated architect-engineer contract and by the operating contractor. To the extent feasible, construction and procurement will be accomplished by fixed-price prime contracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1987	FY 1988	FY 1989	Total
a. Total project costs					
1. Total facility costs					
(a) Construction line item	$ 1,587	$ 5,000	$ 7,113	$ 4,300	$18,000
(b) PE&D	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0
(d) Inventories	0	0	0	0	0
Total facility costs	$ 1,587	$ 5,000	$ 7,113	$ 4,300	$18,000
2. Other project costs					
(a) R&D necessary to complete construction	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Conceptual design costs	350	0	0	0	350
Total other project costs	$ 350	$ 0	$ 0	$ 0	$ 350
Total project costs	$ 1,937	$ 5,000	$ 7,113	$ 4,300	$18,350*

*This total includes $350,000 for a Conceptual Design completed in May 1985.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Non-radiological process waste treatment project
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 86-R-801

---

12. Funding Schedule of Project Funding and Other Related Funding Requirement (continued)

b. Total related annual costs (estimated life: 20 years)

1. Facility operating costs	$ 1,600
2. Programmatic operating expenses not directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to the programmatic effort in the facility	0
5. Other costs	600*
Total related annual costs	$ 2,200**

*This cost is a one-time cost in FY 1985.
**These costs are expressed in FY 1984 dollars and do not include overhead.

13. Narrative Explanation of Funding Schedule

a. Total project funding

1. Total facility costs

(a) Construction line item

No narrative required.

(b) PE&D

No narrative required.

(c) Expense funded requirement

No narrative required.

---

1. Title and location of project: Non-radiological process
waste treatment project
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 86-R-801

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13. Narrative Explanation of Funding Schedule (continued)

(d) Inventories

No narrative required.

2. Other project funding

(a) R&D necessary to complete construction

No narrative required.

(b) Conceptual design costs

Approximately $350,000 will be spent in FY 1985 to provide a Conceptual Design.

b. Total related funding requirement

The useful life of the NRWTP is 20 years.

1. Facility operating costs

These estimated costs include chemicals and supplies, labor costs, utilities, and waste disposal.

2. Programmatic operating expenses not directly related to the facility

No narrative required.

3. Capital equipment not related to construction but related to the programmatic effort in the facility

No narrative required.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Non-radiological process waste treatment project
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 86-R-801

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13. Narrative Explanation of Funding Schedule (continued)

4. GPP or other construction related to the programmatic effort in the facility

No narrative required.

5. Other costs

This estimated cost is to conduct waste stream characterization, treatability studies, effluent definition, and other support activities necessary prior to Title I and II design of this project.

DEPARTMENT OF ENERGY
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
SUPPORTING SERVICES

VOLUME 3

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DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

IN-HOUSE ENERGY MANAGEMENT

The goal of the In-house Energy Management Program is to reduce energy consumption and utility/energy costs for the Department's facilities. As such, the program supports all mission areas. The program is structured to survey and study facilities and processes owned by the Department in order to identify retrofits and modifications to Departmental facilities which save energy and have a high return on investment. Projects identified are competed on a DOE-wide basis and selected to maximize the Department's economic return.

Recent significant accomplishments include:

- $1,895,000 was invested in FY 1986 for surveys and studies to identify retrofit projects for future funding and to identify no or low cost operational changes to reduce current energy consumption.

- Twenty-six projects were funded in FY 1986 which, when complete, will have a payback of 1.6 years.

- FY 1985 energy consumption per square foot in DOE buildings has been reduced by 16.1 percent as compared to FY 1975.

- FY 1985 petroleum consumption in DOE buildings has been reduced by 52 percent as compared to FY 1975.

Specific objectives for FY 1987:

- To reduce energy consumption per square foot in DOE buildings by one percent each year.

- To identify and fund additional retrofit projects with a high rate of return on investment as required by the National Energy Conservation Policy Act, Public Law 95-619, in order to improve the energy efficiency and reduce operating costs of the Department of Energy. Continuation of an annual program of quick payback retrofit projects for the Department's facilities reduces outyear utility costs, provides a rate of return exceeding 35 percent on the dollars invested and will meet goals set by legislation and executive order.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
IN-HOUSE ENERGY MANAGEMENT
ENERGY SUPPLY RESEARCH AND DEVELOPMENT - OPERATING EXPENSES
ENERGY SUPPLY RESEARCH AND DEVELOPMENT - PLANT AND CAPITAL EQUIPMENT
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY1987 Base	FY1987 Request	Request vs Base
Operating Expenses					
Surveys and Studies	$2,000	$1,895	$1,895	$1,500	$-395
Construction					
Modifications for Energy Management, Various Locations	10,000	4,811	4,811	9,003	+4,192
Cogeneration Facility, Brookhaven National Laboratory	1,600	4,811	0	0	0
Solid Waste Fired Boiler Facility, Los Alamos National Laboratory	0	1,732	1,732	5,868	+4,136
Advanced Test Reactor Waste Heat Recovery, Idaho National Laboratory	0	0	0	0	0
Fuel Storage Facility, Brookhaven National Laboratory	1,000	1,443	1,443	57	-1,386
Combustion Air Preheater, Energy Technology Engineering Center	1,400	1,828	1,828	72	-1,756
Energy Monitoring and Control System, Mound Facility	0	0	0	0	0
General Reduction		-4,811			
Subtotal					
Operating Expenses	2,000	1,895	1,895	1,500	-395
Construction	14,000	9,814	9,814	15,000	+5,186
In-house Energy Management	$16,000	$11,709 1/	$11,709 1/	$16,500	$+4,791
Less use of prior year deobligations	- 1,179				
Total In-house Energy Management	$14,821	$11,709	$11,709	$16,500	$+4,791

1/ This amount excludes $2,791,000 proposed to be reprogrammed to the Office of Scientific and Technical Information.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT
ENVIRONMENTAL COMPLIANCE UPGRADE
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: General plant projects
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 87-R-770

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3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 2nd Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: None
Date:

6. Current cost estimate: $3,000
Less FY 1985 PE&D: 0
Net cost estimate $3,000
Date: January 1985

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7. Financial Schedule:

Fiscal Year	Obligations	Costs FY 1985	Costs FY 1986	Costs FY 1987	Costs After FY 1987
1987	3,000	0	0	1,500	1,500

8. Brief Physical Description of Project

These projects provide for the many miscellaneous alterations, additions, modifications, replacements, and non-major new construction items required to reduce or eliminate environmentally harmful discharges from ORNL.

o Upgrade Process Waste Collection System, 2000 area .... $ 800

This project will provide modifications to the Process Waste Collection System in the 2000 area of ORNL. Preliminary investigations indicate that inappropriate cross-connections between the various collection systems exist which allow process effluents to be discharged to White Oak untreated. This project will correct these inappropriate connections and provide miscellaneous upgrading of system integrity.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: General plant projects
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2. Project No.: 87-R-770

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8. Brief Physical Description of Project (continued)

- Groundwater Monitoring Network, Phase III .... $ 350

  This project is Phase III of an overall groundwater monitoring network being installed at ORNL and surrounding areas to determine to what extent the groundwater is contaminated. This network consists of a large number of groundwater wells strategically located around specific impoundments, pits, disposal areas, etc.

- Hydrostatic Head Measuring Stations, Bethel Valley 950

  This project consists of the construction of several Hydrostatic Head Measuring Stations at preselected locations in the Bethel Valley area. Each station will consist of a cluster of three separate wells, one drilled to a depth of about 80 feet below grade, a second drilled to a depth of 200 feet below grade, and a third drilled to a depth of 400 feet below grade.

- Wastewater Piping Replacement, 4500 Area 900

  This project will provide modifications and upgrading to the Process Waste Collection System in the ORNL 4500 Area. Preliminary investigations indicate that inappropriate cross-connections between the various collection systems exist which allow process effluents to be discharged to White Oak Creek untreated. This project will correct these deficiencies and provide other miscellaneous upgrading of system integrity.

9. Purpose, Justification of Need for, and Scope of Project

- Upgrade Process Waste Collection System, 2000 Area

  Inappropriate connections of process drains to the storm sewer or sanitary sewer introduce Category III effluents to these systems. These effluents are discharged to area streams and exceed ORNL's national Pollutant Discharge Elimination System (NPDES) permit limits. This project is necessary to meet permit compliance requirements.

1. Title and location of project:	General plant projects Oak Ridge National Laboratory Oak Ridge, Tennessee	2. Project No.: 87-R-770

9. Purpose, Justification of Need for, and Scope of Project (continued)

- Groundwater Monitoring Network, Phase III

  Various ponds, impoundments, and other disposal/storage areas around the ORNL site have been determined to be RCRA sites. To meet the RCRA regulations, a groundwater monitoring system must be installed around each of these sites. The monitoring network is needed to determine if groundwater contamination is occurring and to determine containment of RCRA regulated waste.

- Hydrostatic Head Measuring Stations, Bethel Valley

  The hydrostatic head measuring stations will provide the capability to define and model groundwater flow in the ORNL area. It is necessary to develop an accurate description of large-scale groundwater flow in the Bethel Valley area to support alternative evaluations for cleanup actions under both RCRA and CERCLA.

- Wastewater Piping Replacement, 4500 Area

  Inappropriate connections of process drains to the storm sewer or sanitary sewer introduce Category III effluents to these systems. These effluents are discharged to area streams and exceed ORNL's National Pollutant Discharge Elimination System (NPDES) permit limits. This project is necessary to meet permit compliance requirements.

10. Details of Cost Estimate

The estimated costs are preliminary and in general indicate the magnitude of each program. These costs included engineering, design, construction, and inspection.

11. Method of Performance

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by firm fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	General Reduction	FTE General Reduction	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
In-house Energy Management							
Survey and Studies Operating Expenses	$ 2,000	$ -24	$ -6	$ -75	$1,895	--	$ 1,895
Modifications for Energy Management, Various Locations Construction	5,000	--	--	-189	4,811	--	4,811
Fuel Storage Facility, Brookhaven National Laboratory Construction	1,500	--	--	-57	1,443	--	1,443
Cogeneration Facility, Brookhaven National Laboratory Construction	5,300	--	--	-200	5,100	-289	4,811
Combustion Air Preheater, Energy Technology Engineering Center ... Construction	1,900	--	--	-72	1,828	--	1,828
Solid Waste Fired Boiler Facility, Los Alamos National Laboratory Construction	1,800	--	--	-68	1,732	--	1,732
Energy Monitoring and Control System, Mound Facility Construction	1,700	--	--	-64	1,636	-1,636	--
Waste Heat Recovery, Idaho National Laboratory Construction	900	--	--	-34	866	-866	--
Subtotal, In-House Energy Mgmt.	20,100	-24	-6	-759	19,311	-2,791	16,520
General Reduction: Capital Equipment	-5,024	24	--	189	-4,811	--	-4,811
FTE Reduction	-6	--	6	--	--	--	--
Total, In-House Energy Mangement	$15,070	$ --	$ --	$ -570	$14,500	$-2,791	$11,709
Operating Expenses	2,000	-24	--	-75	1,895	--	1,895
Capital Equipment	-5,024	+24	--	189	-4,811	--	-4,811
Construction	18,100	--	--	-684	17,416	-2,791	14,625

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
IN-HOUSE ENERGY MANAGEMENT
(In thousands of dollars)

FY 1986 Adjusted Appropriation	$11,709
Built in increases and decreases:	
None	0
1987 Base	$11,709
Program increases and decreases:	
Surveys and Studies Operating Expense - Decrease the number of surveys and studies	- 395
Modifications for Energy Management, Various locations - Increase the number of small retrofits	+ 4,192
Solid Waste Fired Boiler Facility, Los Alamos National Laboratory - Complete the FY 1986 project	+ 4,136
Fuel Storage Facility, Brookhaven National Laboratory - Complete the FY 1985 retrofit project	- 1,386
Combustion Air Preheater, Energy Technology Engineering Center - Complete the FY 1985 retrofit project	- 1,756
FY 1987 Budget Request	$16,500

In-house Energy Management
Narrative Justification

The FY 1987 budget request for the In-house Energy Management Program is $16,500,000, which is a $4,791,000 increase over the FY 1986 adjusted appropriation. The requested amount reflects a continuing effort to hold down DOE energy costs by funding quick payback energy saving retrofit projects for DOE facilities. Major program objectives are: to retrofit all Department buildings by FY 1990 as required by the National Energy Conservation Policy Act of 1978 (Public Law 95-619), to improve the efficiency of the Department's central heating plants by retrofitting and improving plant operation, and to reduce energy consumption in the Department's facilities by one percent per year. Specific program elements include:

- Surveys of existing buildings and processes to identify cost effective energy conservation retrofits and central heating plant improvements.
- Energy conservation retrofit projects to improve the energy efficiency of process and production systems at various field sites.
- Energy conservation retrofit projects to improve the energy efficiency of DOE buildings.
- Central heating plant improvement projects to increase the efficiency of the Department's central heating plants.

The proposed funding level of $16,500,000 will allow continuation of surveys to identify future years' retrofits and provides continuation of retrofit projects begun in FY 1985 and FY 1986. The projects proposed have an average payback of 2.2 years, a rate of return on investment of over 35 percent, and provide outyears utility savings for all DOE programs.

The following is a summary of the program:

Energy conservation surveys and studies $1,500,000

These operating funds are required to conduct energy conservation surveys of existing buildings and process and production systems in order to identify retrofit projects to reduce energy consumption and utility costs. These funds are used to a much lesser extent to develop model programs for DOE sites, such as the boiler operator training and tuneup program. The energy conservation surveys accomplished under this funding provide the engineering investigations to document energy savings resulting from proposed retrofits, address life-cycle cost effectiveness and provide construction cost estimates for retrofits for future funding.

In-house Energy Management

Modifications for Energy Management, Various Locations $9,003,000

This line item provides funds for various small energy conservation retrofits costing less than $1,200,000 each. These small energy conservation retrofits are competed DOE wide and prioritized on economic return, thus assuring the greatest return on investment for the Department for the funds invested. The projects selected for funding under this line item have an average payback of 2.1 years.

Solid Waste Fired Boiler Facility, Los Alamos National Laboratory..$5,868,000

This funding provides for the completion of a project to provide a boiler which fires solid waste and provides steam for the Los Alamos Lab. The project has a total estimated cost of $7.6 million and a payback of 2.5 years.

Fuel Storage Facility, Brookhaven National Laboratory..$ 57,000

This funding provides for the completion of a project for the installation of three 8,000 barrel fuel storage tanks, clarifiers, and associated piping and pumps for waste liquid fuel feedstocks that are not miscible with No. 6 fuel oil but can be burned in the site's boilers. The project has a total estimated cost of $2.7 million and a payback of 2.6 years.

Combustion Air Preheater, Energy Technology Engineering Center..$ 72,000

This funding provides for the completion of a project for the installation of a combustion air preheat system to reduce fuel consumption. The project has a total estimated cost of $3.3 million and a payback of 2.4 years.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT - PLANT AND CAPITAL EQUIPMENT
ENERGY APPLICATIONS
IN-HOUSE ENERGY MANAGEMENT
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Modifications for Energy Management, Various Locations

2. Project No. 87-A-601

3. Date A-E work initiated: 2nd Qtr. FY 1987

3a. Date physical construction starts: 4th Qtr. FY 1987

4. Date construction ends: 1st Qtr. FY 1990

5. Previous cost estimate:
Date: None

6. Current cost estimate: $9,003
Date: June 1985

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$9,003	$9,003	$9,003	$1,800
1988	0	0	0	3,252
1989	0	0	0	3,251
1990	0	0	0	700

8. Brief Physical Description of Project:

This line item is for various small retrofit projects to reduce energy consumption. These small modifications will be selected on the basis of return on investment and energy savings. Projects compete on a DOE-wide basis for funding under this lump sum item, thus assuring the greatest return and greatest energy savings per investment dollar for the Department. The average payback for this line item based on past experience, is about 2.1 years.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Modifications for Energy Management, Various Locations
2. Project No. 87-A-601

9. Purpose Justification of Need for, and Scope of Project:

Less than 50 of the most economical projects will be funded. The projects range from less than $5,000 to $1,200,000. The projects are for HVAC modifications, insulation of buildings, waste heat recovery, installation of more efficient lighting, steam line modifications, power factor improvements, etc. The quick payback projects selected for this line item will have the following total life-cycle cost effect utilizing a present value analysis:

Average Savings to Investment Ratio (SIR)	7.1
Average Payback Period	2.1
Total Annual Energy Savings	939 billion Btus
Annual Dollar Savings	$3,979,500

10. Details of Cost Estimate:

There are less than 50 projects each with total estimated cost (TEC) less than $1,200,000 which will be funded by this line item. The projects will be selected on the basis of economic return.

11. Method of Performance:

Design and inspection will be performed under negotiated architect-engineer contracts. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Requirements:

Not required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not required.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT - PLANT AND CAPITAL EQUIPMENT
ENERGY APPLICATIONS
IN-HOUSE ENERGY MANAGEMENT
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Solid Waste Fired Boiler Facility, Los Alamos National Laboratory, New Mexico

2. Project No. 86-A-605

3. Date A-E work initiated: 2nd Qtr. FY 1986

3a. Date physical construction starts: 4th Qtr. FY 1986

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: None
Date:

6. Current cost estimate: $7,600
Less amount for CP&D 0
Net cost estimate: $7,600
Date: February 1984

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1986	$1,732	$1,732	$1,732	$ 700
1987	5,868	5,868	5,868	6,800
1988				100

8. Brief Physical Description of Project:

The project to be funded is a waste heat recovery facility, fueled by readily available industrial and municipal refuse. This nonhazardous Solid Waste Reduction Facility would be housed in an approximately 16,500 square foot building located on a 2-1/2-acre fenced site at S-Site (TA-16). Adjacent to an exisiting 33 year old central steam plant, this new facility would replace the existing steam plant and provide the heating and process steam for 65 buildings in two technical areas, through an existing piping distribution system.

1. Title and Location of Project: Solid Waste Fired Boiler Facility
Los Alamos National Laboratory,
New Mexico

2. Project No. 86-A-605

8. Brief Physical Description of Project: (Continued)

Road work to be included is removal of approximately 830 linear feet of existing road and construction of approximately 1,500 linear feet of new two-lane site service road, consistent with the Laboratory Long Range Development Plan. Improvements to the main arterial, State Road 4, provide for highway safety to accommodate slow-moving garbage trucks serving the facility and include 400 linear feet of acceleration and deceleration lanes, left-hand turn lane, and 500 linear feet transition zones for a total of 1,400 linear feet of two-lane road widened to four-lane and approximately 4,000 linear feet total two-lane highway widened to three-lane for an adequate passing zone in a mountainous area. Approximately 1,300 linear feet of chain-link industrial security fence is included for the site perimeter.

The facility houses utility process functions including steam generation. The following equipment listed in order of the process is required: garbage truck weigh-in scale; radiation monitoring alarm system; knuckleboom crane, fuel feed system; chemical feed and boiler feedwater system; 45-ton per day controlled air technology incinerators; 12,000-lb. per hour fire-tube waste heat recovery boilers; 300 Boiler Horse Power packaged auxiliary boilers; 30,000 SCFM electrostatic precipitators; ash removal system; ash disposal system, and chilled water equipment.

Two complete 45-ton per day modules as described would be provided to ensure maintenance, reliability, steam production, and refuse disposal, underscored by the projected growth of both steam usage and refuse supply over the facility's 20-year lifetime. All the listed equipment is standard and commercially available with a proven history of operation. It would be installed in a pre-engineered metal building, 30-feet eave height, with a concrete slab unloading floor. This unloading floor inside the facility allows refuse to be deposited from the refuse trucks within the building confines and precludes the problems associated with wind-blown waste. Approximately 3-days storage would be provided inside, although the incinerator design would be based upon daily clearance of refuse.

The 16,500 square foot building interior is essentially open and unpartitioned with grating-type walkways on a mezzanine level to facilitate equipment servicing. The interior rooms will be limited to minimal support areas, including a weight scale office, superintendent's office, boiler operator's control room, locker rooms, rest rooms, maintenance shop, and parts storage for a total of approximately 2,500 square feet. The building will be heated by steam unit heaters and duct furnaces. Adequate mechanical ventilation will be provided. The building will be protected by a wet-pipe automatic sprinkler system.

1. Title and Location of Project: Solid Waste Fired Boiler Facility
Los Alamos National Laboratory,
New Mexico

2. Project No. 86-A-605

8. Brief Physical Description of Project: (Continued)

The project, as proposed, is consistent with the Laboratory Long-Range Plan, Five-Year Implementation Plan, and the Energy Management Plan. Utilities to be provided include natural gas, steam, condensate, electricity, water, and telephone. All existing utilities in the area have been located and the new facility site was chosen to avoid these while still providing for convenient connections.

Standard equipment is a truck to haul dumpster boxes to the stockpile area or sanitary landfill for dumping as they become full of ash. Included is a 5-ton short-bed truck with two dumpster boxes for alteration.

9. Purpose, Justification of Need for, and Scope of Project:

The objectives of this project are:

- To conserve fossil fuels through cost effective alternative fuel displacement.
- To efficiently provide heating and process steam for 65 buildings through incineration of Laboratory and Los Alamos County nonhazardous waste.
- To provide a life-cycle cost effective facility with a short payback period.
- To avoid the siting and construction of any unnecessary new sanitary landfills.
- To implement the Laboratory Long-Range Plan.

The Los Alamos National Laboratory and the County of Los Alamos exist in a unique and closely-bound relationship. Identifiable almost as a "company town," the situation exists where a fuel supplier and an energy user have interconnecting goals. Reduction of waste and reduction of energy use are, in this case, mutually compatible.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Solid Waste Fired Boiler Facility
Los Alamos National Laboratory,
New Mexico

2. Project No. 86-A-605

9. Purpose, Justification of Need for, and Scope of Project: (Continued)

The County has a waste disposal "problem" and the Laboratory has a fuel usage "need."

The facility proposed will handle the total combustible waste stream currently being landfilled, along with projected volumes through the year 2007. Approximately 80% of the combustible fuel for this facility would be supplied by the Los Alamos County from municipal and commercial refuse collections and would be delivered to the new facility. The 20% supplied by the Laboratory would be transported by the Laboratory maintenance contractor to the new facility.

The community populace will access the new facility indirectly through normal municipal collections and by depositing rubbish at a community transfer station. This station will be serviced by packing-type garbage trucks, which will transfer the waste to the waste reduction plant.

This facility provides a waste volume reduction of 90% to 95%. Thus, any remaining County landfill, which is located on DOE land, gains a 10 to 20 times increase in lifetime from the use of incineration. The residual 5% to 10% ash, a granular cinder-type material, can be used as road base and structural fill as it already is in some states. This would further extend the landfill's useful lifetime.

Recovering the waste heat from the incineration process will provide from 48% to 57% of the steam needs of the 65 existing buildings. This fuel percentage from waste requires the balance to be provided by auxiliary packaged fire-tube boilers. These will be sized to match the existing and projected steam load more closely than does the existing 33-year-old plant being replaced. The existing facility is beyond its expected life, is inefficient, and does not have solid waste alternative fuel capabilities. The existing facility would be rendered inactive to provide an emergency back up ensuring the programmatic weapons related work at the technical areas served would not be interrupted.

The proposed timing of the construction is critical. If the facility is not constructed on time, the existing landfill, with a projected life of 3 years, may fill before the alternative solid waste reduction facility is completed.

1. Title and Location of Project:	Solid Waste Fired Boiler Facility Los Alamos National Laboratory, New Mexico	2. Project No. 86-A-605

9. Purpose, Justification of Need for, and Scope of Project: (Continued)

Failure to fund this project will result in discarding approximately 2.82 billion Btus of fuel resource into a nonrecoverable landfill, which will further encumber another laboratory resource, land. The existing TA-16 steam plant would be operated at its current level of inefficiency. Its need for replacement can be anticipated in the future because it is already beyond its expected operating lifetime. Its continued use beyond expected lifetime could affect programmatic efforts at TA-16 and Anchor Site East (TA-9) through unreliable steam production, and/or higher maintenance costs.

A life cycle cost analysis, performed in accordance with NBS Handbook 135, revised 9/84, yields the following:

Savings to Investment Ratio	6.4
Payback Period	2.5 years
Annual Energy Savings	250 Billion Btus
Annual Dollar Savings	$2,782,309

10. Details of Cost Estimate:*

a. Engineering, design, and inspection cost**		$670
(1) Facilities at about 15% of construction costs, less Item b.3	$ 340	
(2) Special facilities equipment costs at about 10% of Item b.3	330	
b. Construction costs		
(1) Improvements to land, including intersections, road, and sitework	1,150	

* The above estimate is based on a completed conceptual design and a technical study by an architect engineering firm. The Laboratory is using escalation rates of 3.1% for CY 1984, 6.1% for CY 1985, 7.6% for CY 1986, 6.6% for CY 1987 and 6.9% for CY 1988. These rates were forecasted using Data Resources, Incorporated forecasting services. These services were contracted by the Department of Energy.

** Engineering, design, and inspection costs are projected from historical records and experience, then applied based on the complexity of the project.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Solid Waste Fired Boiler Facility
Los Alamos National Laboratory,
New Mexico

2. Project No. 86-A-605

10. Details of Cost Estimate:* (Continued)

(2) Building - 16,500 square feet @ about $61/square feet	980	
(3) Special facility equipment, including fuel feed, and ash handling systems, incinerators, central steam equipment, radiation monitoring, and pollution control equipment.	3,360	
(4) Utilities, including natural gas, steam, condensate, electricity, water, and telephone.	160	
c. Standard equipment		80
d. Contingency @ approximately 19% of the above costs***		1,200
Total project cost		$7,600

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract. Special facility equipment design and procurement will be performed by the operating contractor. Standard equipment procurement will be by the operating contractor. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY-1986	FY-1987	FY-1988	Total
a. Total Project Funding					
1. Total facility cost					
(a) Construction line item.....	$ 0	$ 700	$6,800	$ 100	$7,600
(b) PE&D......................	0	0	0	0	0
(c) Expense funded equipment...	0	0	0	0	0
(d) Inventories................	0	0	0		
Total Facility Costs.......	$ 0	$ 700	$6,800	100	$7,600

*** Contingencies are applied to items based on the uncertainties of the development at the conceptual level.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Solid Waste Fired Boiler Facility
Los Alamos National Laboratory,
New Mexico

2. Project No. 86-A-605

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (Continued)

	Prior Years	FY-1986	FY-1987	FY-1988	Total
2. Other project costs					
(a) Conceptual design..........	$100	$ 0	$ 0	$ 0	$ 100
(b) Other projected related costs....................	0	0	0	0	0
Total other projected funding..................	100	0	0	0	100
Total project costs (Item 1 & 2)............	$100	$ 700	$6,800	$ 100	$7,700

b. Total related funding requirement (estimated life of project: 20 years)

1. Facility operating costs..	$1,400
2. Programmatic operating expenses directly related to the facility....................	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility..	0
4. GPP or other construction related to programmatic effort in facility...............	0
5. Other costs..	0
Total other related annual funding requirements.................................	$1,400

13. Narrative Explanation of Total Project Funding and Other Related Requirements

a. Total project funding

(1) Total facility costs. No narrative required.

(2) Other project funding

(a) The amount shown is for conceptual design that is necessary to establish the specific design and construction features.

(b) Other project-related costs. No narrative required.

1. Title and Location of Project: Solid Waste Fired Boiler Facility
Los Alamos National Laboratory,
New Mexico

2. Project No. 86-A-605

13. Narrative Explanation of Total Project Funding and Other Related Requirements: (Continued)

b. Total related funding requirements

(1) The annual facility operating costs are estimated to FY 1988, the first full year of operation as follows: Historical costs from similar operating central steam plants, both at the Laboratory and Nationwide, were escalated from FY 1983 by 3.1% for FY 1984, 6.1% for FY 1985, 7.6% for FY 1986, and 6.6% for FY 1987. Fuel costs adjusted for alternative fuel contribution were escalated using the required rates from the Federal Register.

(2) This facility is solely utility related and requires no programmatic-related funding.

(3) Capital equipment requirements unrelated to construction are not anticipated

(4) No GPP or other construction related to programmatic effort are anticipated.

(5) No other costs are anticipated.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT - PLANT AND CAPITAL EQUIPMENT
ENERGY APPLICATIONS
IN-HOUSE ENERGY MANAGEMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Fuel Storage Facility
Brookhaven National Laboratory,
Upton, N.Y

2. Project No. 85-A-602

3. Date A-E work initiated: 3rd Qtr. FY 1985

3a. Date physical construction starts: 1st Qtr. FY 1986

4. Date construction ends: 2nd Qtr. FY 1987

5. Previous cost estimate: $2,700
Less amount for PE&D 200
Net cost estimate: $2,500
Date: September 1982

6. Current cost estimate: $2,700
Less amount for PE&D 200
Net cost estimate: $2,500
Date: October 1984

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$1,000	$1,000	$1,000	$ 700
1986	1,443	1,443	1,443	1,300
1987	57	57	57	500

8. Brief Physical Description of Project:

This project provides for the installation of three (3) 8,000 barrel fuel storage tanks, clarifiers, transfer pumps, associated piping controls and electrical work. The facility will be used for the storage of inexpensive, low viscosity, light feedstocks that are not miscible with No. 6 fuel oil, and can be directly fired in the existing boilers at the Central Steam Facility.

1. Title and Location of Project: Fuel Storage Facility
Brookhaven National Laboratory
Upton, N.Y.

2. Project No. 85-R-602

8. Brief physical Description of Project: (Continued)

The fuel storage system and equipment configuration will remove any noncombustibles (e.g., water, sediments, etc.) before the fuel is transferred into the existing fuel oil storage and piping system. The new equipment will be integrated into, and be part of, the existing fuel oil system at the Central Steam Facility. This project will also serve to reinforce the rather marginal 45 day useable fuel storage supply presently existing at the Laboratory. Light feedstock material is received from vendors and stored in existing small capacity (10,000 gallon) receiving tanks. A quality control analysis is conducted for verifying fuel and environmental standards. Acceptable fuel will then pass through the new clarifiers to remove solids, water, etc., and be transferred to one of the new 3,000 barrel storage tanks.

Each storage tank will be connected to the existing fuel oil storage and piping system within the Central Steam Facility with separate supply and return fuel piping. Each tank will be a fixed roof, vertical tank constructed in accordance with API and NFPA tank storage standards. The storage facility will be impounded by an earthen, impervious dike, and all transfer piping will be above ground.

9. Purpose, Justification of Need for, and Scope of Project:

There is insufficient capacity at the tank farm to store non-miscible light feedstocks and for blended alternate liquid fuels for firing the boilers at the Central Steam Facility. Presently, three of the six major storage tanks are used for holding, blending and processing of the various products to make the Alternate Liquid Fuels. The other three (17,300 barrels) represent approximately 42% of the tank farm capacity. The other three tanks (24,300 barrels) are used as day tanks for the finished product of either blended alternate liquid fuels or light feedstocks for direct firing of the boilers. At a nominal winter firing rate of 25,000 gallons of fuel in a 24 hour period, the finished fuel storage capacity represents only a 40 day supply.

In addition, the non-miscible, light feed stock fuels have a Btu content of 80,000 to 115,000 Btu/gallon and, therefore, require approximately 40% greater storage capacity than virgin No. 6 and blended alternate liquid fuel for the same comparable fuel Btu content. These non-miscible light feed stocks represent a significant and as yet untapped resource for Brookhaven's on-going Alternate Liquid Fuels program.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW
TECHNICAL INFORMATION MANAGEMENT PROGRAM

The Department of Energy's (DOE) multi-billion dollar annual research and development (R&D) effort is characterized by over 5,000 research projects carried out on a decentralized basis at over 2,700 diverse sites by more than 40,000 people working in the R&D program. This research generates approximately 40,000 documents reporting on DOE-funded research per year.

The Technical Information Management Program (TIMP) was developed by DOE to manage the results from this extensive research effort by operating a centralized techical information program responsible for collecting these results, managing the processing and access to these results using various information technologies, and disseminating the results to DOE-funded researchers and program managers. This information is also used to obtain on a reciprocal basis comparable research information from foreign countries and to support the Department's international collaborative R&D programs.

The primary goals of TIMP are (1) to ensure cost effective and efficient management, control, and accountability of DOE-funded research results, and (2) to obtain worldwide energy R&D results for use by DOE and U.S. scientists, engineers, and program managers. As part of the overall Departmental program, TIMP is responsible for the management, control, and dissemination of classified and sensitive materials produced in its DOE R&D programs.

Significant recent accomplishments include:

- Expanded international information exchange programs by concluding a bilateral agreement with the United Kingdom, initiating development of a centralized information system with the International Energy Agency (IEA) and proceeding on the development of a bilateral agreement with Japan.
- Continued leadership role in fulfilling existing U.S. obligations to the International Atomic Energy Agency (IAEA), International Energy Agency (IEA), and seven nations with which the U.S. has bilateral agreements in force.
- Continued management of the DOE master file on worldwide energy R&D. This energy database lets program managers, scientists, and engineers determine what research has already been completed before beginning new projects. Almost 200,000 such completed projects or efforts are added to the database each year.
- Implementation of a system which will provide classified research results to authorized users on a nationwide basis utilizing encrypted and secure voice equipment.
- Continued evaluation of the activities of DOE field sites to ensure that Departmental technical information policies and procedures are followed.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project:	Fuel Storage Facility Brookhaven National Laboratory Upton, N.Y.	2. Project No. 85-A-602

9. Purpose, Justification of Need For, and Scope of Project: (Continued)

The proposed additional tank storage facility will be dedicated to the storage of light feedstocks which will permit the Laboratory to purchase light waste fuels during the Spring, Summer and Fall (non-heating season) when availability is good and prices are lowest. (During the heating season, many generators of these materials consume them in their own boilers, restricting the availability of spot purchases by the Laboratory). Installation of this facility will permit the Laboratory to inventory up to 24,000 barrels of light, non-miscible, feedstocks, thereby allowing the displacement of an additional 17,200 barrels of critical, expensive, imported virgin No. 6 fuel oil. This represents a potential savings of $917,000 annually.

Economic Analysis

The proposed facility has many recognizable and tangible economic factors to justify its approval. A Life Cycle Costing (LCC) analysis based on the expected reduction of critical virgin No. 6 fuel oil was performed in accordance with the NBS Handbook No. 135, revised September 1984 and the November 16, 1981 Federal Register guidelines. A detailed engineering analysis leading to the amount of energy savings, coupled with a present value analysis yields the following Investment Analysis Summary:

INVESTMENT ANALYSIS SUMMARY

Savings to Investment Ratio (SIR)	6.8
Payback Period	2.6 years
Annual Energy Savings	533 Billion Btus
Annual Dollar Savings	$917,000

10. Details of Cost Estimate

Item	(Dollars in Thousands) Item Cost	Total Cost
a. Architect-Engineer, design and inspection at approximately 14% of Construction Costs..		$ 250

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Fuel Storage Facility
Brookhaven National Laboratory,
Upton, N.Y.

2. Project No. 85-A-602

10. Details of Cost Estimate: * (Continued)

b. Construction Costs			2,100
Site work		$ 123	
8,000 barrel fuel storage tanks	(3 @ $205,000 ea.)	615	
Tank foundations	(3 @ 41,000 ea.)	123	
Centrifuge clarifiers	(2 @ 270,000 ea.)	540	
Fuel transfer pumps	(2 @ 18,000 ea.)	36	
10,000 gallon transfer tank		18	
Piping, supports and accessories		591	
Electrical work		54	
c. Contingency at approximately 15% of above costs			350
Total Costs			$2,700

* Escalation rates conform to the guidelines prescribed in the Department of Energy Field Budget Process Chapter, February 1982, which are based on the materials and labor data contained in the Energy Supply Planning Model and escalation rates forecasted by the Data Resources, Incorporated (DRI). Escalation rates used for FY 1983, 1984, 1985 and 1986 (until midpoint of construction) were respectively 9.6%, 9.0%, 9.9% and 8.5 percent.

11. Method of Performance:

Design and inspection will be performed under a negotiated Architect-Engineer contract. Construction and procurement will be accomplished by fixed-price contracts and purchase orders awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Requirements:

Not required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not required.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
ENERGY SUPPLY RESEARCH AND DEVELOPMENT - PLANT AND CAPITAL EQUIPMENT
ENERGY APPLICATIONS
IN-HOUSE ENERGY MANAGEMENT
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and Location of Project: Combustion Air Preheaters
Energy Technology Engineering Center
Santa Susana, California

2. Project No. 85-A-604

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3. Date A-E work initiated: 2nd Qtr. FY 1986

3a. Date physical construction starts: 2nd Qtr. FY 1986

4. Date construction ends: 2nd Qtr. FY 1987

5. Previous cost estimate: $3,300
Less amount for PE&D 0
Net cost estimate: $3,000
Date: May 1982

6. Current cost estimate: $3,300
Less amount for PE&D 0
Net cost estimate: $3,300
Date: May 1982

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1985	$1,400	$1,400	$1,400	$ 300
1986	1,828	1,828	1,828	2,000
1987	72	72	72	1,000

8. Brief Physical Description of Project:

This energy conservation project provides for modifications to the Sodium Components Test Installation, an existing facility at the Energy Technology Engineering Center (ETEC), to reduce the projected facility fuel consumption by addition of a combustion air preheat system to each of the H-1 and H-2 sodium heaters. During steam generation testing at power levels at 70 MWt, stack gas temperature will vary from 700 to 1500 degrees F.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project:	Combustion Air Preheaters Energy Technology Engineering Center Santa Susana, California	2. Project No. 85-A-604

8. Brief Physical Description of Project: (Continued)

Stack gas will be used to preheat incoming combustion air to 600 degrees F. This project consists of two modifications: One for the H-1 heater; and one for the H-2 heater. The two existing combustion air fans will be removed and replaced by one each forced and induced draft fans. A new stack will be provided. The heater windbox and the burner throat brickwork will be enlarged. The oil and gas burners will be modified. For the H-1 heater, new forced draft and induced fans are required. The existing stack, air entrance plenum, and windbox will be modified. The existing air flow control damper and actuator control system will be relocated. The east and west faces of the heater will be insulated.

9. Purpose, Justification of Need for, and Scope of Project:

Addition of air preheaters to the H-1 and H-2 sodium heaters will reduce fuel consumption by 11%. This amount of energy savings for a 15 year study period yields the following life cycle cost analysis:

Savings to Investment Ratio	3.7
Payback Period	2.4 years
Annual Energy Savings	184 Billion Btus
Annual Dollar Savings	$1,282,000

10. Details of Cost Estimate:

a. Engineering, Design and Inspection		370
Title I Engineering	35	
Title II Engineering	300	
Title III Engineering	35	
b. Land and Land Rights		0

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Combustion Air Preheaters
Energy Technology Engineering Center
Santa Susana, California

2. Project No. 85-A-604

10. Details of Cost Estimate: (Continued)

c. Construction Costs		$2,180
Fans and Drives	400	
Ductwork and Structure	180	
Stack and Stack Penetrations	37	
Burner Modifications	230	
Insulation	360	
Preheaters	300	
Concrete Work	36	
Equipment Relocation	37	
Electrical and I & C	530	
Painting	70	
d. Construction Management, Technical Management and Procurement Services		200
Subtotal		2,750
Contingency at 20%		500
Total project estimate		$3,300

11. Method of Performance:

The Title I and II engineering design will be performed by ETEC. ETEC will provide design of the preheat system, support structures, electrical power, ductwork, control, and associated instrumentation. ETEC will prepare and maintain the system design description. Procurement will be accomplished by ETEC based on competitive bidding. Construction will be performed under competitively bid, fixed-price contracts with ETEC performing construction management and Title III services during construction.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Combustion Air Preheaters
Energy Technology Engineering Center
Santa Susana, California

2. Project No. 85-A-604

12. Funding Schedule of Project Funding and Other Related Requirements:

Not required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not required.

- Continued monitoring of the receipts of DOE-funded R&D deliverables that ensure contractors meet contract specifications.

- Expanded comprehensiveness of the Research-In-Progress (RIP) database. With this database, DOE researchers determine what research is under way before starting new research projects.

- Completed the reproduction and shipment of all unclassified DOE technical reports published during the period 1976-1986 to [illegible] Congressionally designated depository libraries.

Objectives for FY 1987

- To fulfill U.S. commitments to international energy agencies and bilateral agreement signatories.

- To continue to manage an effective scientific and technical information facility providing management of and access to R&D results for the DOE research program.

- To introduce more cost-effective and efficient processes into the central Departmental scientific and technical information facility as new technology becomes available and resources permit.

- To improve DOE accountability and reporting procedures for R&D contract deliverables.

- To continue to manage classified and sensitive energy data most effectively in the interest of national security.

- To continue to implement and expand technical information appraisal programs to ensure compliance with Departmental technical information policies and procedures.

- To continue to provide standards, guidance, and support to the DOE technical information management infrastructure.

Accomplishment of the objectives of the centralized Technical Information Management Program is consistent with the Department's responsibilities regarding control, protection, and access to scientific and technical information as stated in 42 U.S.C. 7112, 7261 and 5813, and Executive Orders on national security information. The TIMP will continue to carry out its responsibility in the development and implementation of Departmental policy in the area of scientific and technical energy information exchange and provide a system which will help to minimize costly duplication of effort, protect information affecting national security, and increase scientific productivity.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
TECHNICAL INFORMATION MANAGEMENT PROGRAM
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request
Technical Information Management Program				
Operating Expenses	$ 12,642	$ 13,072	$ 13,072	$ 13,848
Capital Equipment	800	550	550	850
Subtotal	$ 13,442	$ 13,622	$ 13,622	$ 14,698
Less transfer of prior year unobligated authority from In-House Energy Management:		-1,209	-1,209	-3,923[2/]
Net Budget Authority	$ 13,442	$ 12,413[1/]	$ 12,413	$ 10,775
Total FTEs	175	175	175	175

Authorization: Section 31, P.L. 83-703

[1/] This amount includes $2,791,000 to be reprogrammed from FY 1986 In-House Energy Management funds.

[2/] Reprogramming from In-House Energy Management.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
Technical Information Management Prog.					
Operating Expenses	$ 9,200	$ -348	$8,852	$2,791	$11,643
Capital Equipment	800	-30	770	--	770
Total, Technical Information Management Program	$10,000	$ -378	$9,622	$2,791	$12,413
Operating Expenses	$ 9,200	$ -348	$8,852	$2,791	$11,643
Capital Equipment	800	-30	770	--	770

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
TECHNICAL INFORMATION MANAGEMENT PROGRAM
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(In thousands of dollars)

FY 1986 Adjusted Appropriation	$ 9,622
Plus transfer of prior year unobligated authority from In-House Energy Management	+1,209
Plus obligational authority to be reprogrammed from FY 1986 In-House Energy Management	+2,791
FY 1986 Revised Appropriation	13,622
Built in increases and decreases	0
FY 1987 Base	$13,622
Program Increases and Decreases	
o Increases for within grades and promotions.	+ 80
o Increase for software conversion	+ 301
o Provide for necessary equipment maintenance.	+ 75
o Escalation increases of contractual services.	+ 320
o Provide for necessary upgrade of capital equipment.	+ 300
FY 1987 Request	$14,698
Less prior year unobligated authority from In-House Energy Management	-3,923
Net Authority	$10,775

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE
TECHNICAL INFORMATION MANAGEMENT PROGRAM
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

The major program responsibilities covered by the funding requirements for the TIMP are:

(1) The development and implementation of specific DOE-wide policies, procedures, and guidelines relating to scientific and technical information (STI).

(2) Program evaluation responsibility to ensure that scientific and technical information policies are effectively carried out.

(3) The management of an international program to allow the U.S. to capitalize on the availability of technical information generated through other nations' energy research and development.

(4) Management of the Technical Information Center, DOE's centralized scientific and technical information facility. This facility is maintained on behalf of all programs to:

  (a) provide management accountability information for DOE-funded information deliverables; and

  (b) make accessible the result of worldwide investment in energy R&D to support research program productivity and ensure that DOE receives the maximum return on its research dollar investment.

The Department's Technical Information Management Program also ensures DOE compliance with legislation establishing the Department of Commerce (NTIS) as the primary distribution center to the U.S. public for federally-funded research and development results and the provision of DOE scientific and technical reports to the nation's depository libraries (15 U.S.C. 1151-57 and 44 U.S.C. 1901-14). Through its TIMP, DOE provides research results to the NTIS for access by U.S. business, industry and the general public, and to GPO's depository libraries. The gross costs of operating the Technical Information Management Program are partially offset by collections from users of its products and services. The program will continue to maximize every opportunity to recover costs.

The major benefits of the program can be grouped into four impact areas:

(1) Research program productivity is increased through cost avoidance and better allocation of resources.

(2) Control and protection of the DOE technology resource in the form of scientific and technical information (STI) is cost-effectively achieved.

(3) DOE management accountability is provided.

(4) DOE and other U.S. funded energy research is exchanged with selected nations on the basis of equity.

Table 1 outlines the major management and control systems which are funded to meet the program responsibilities and to obtain the program benefits.

Narrative (Continued)

Of the $14,698,000 program funding available, approximately $6 million is for personal services and personnel benefit costs for 175 full time equivalent employees and the balance is for contractual services and supplies. The increase of $1,076,000 above the FY 1986 program level of $13,622,000 is for the following:

(1) Personal Services and Personnel Benefits ($80,000) - Although staffing level remains constant at 175 for FY 1986 and FY 1987, additional costs will be increased for within grades and promotions.

(2) Software Conversion ($301,000) - All applications on the DECSYSTEM KL-10 computers must be converted over to the VAX cluster in anticipation of the phase-out of the KL-10s in FY 1988. This increase is for the software requirements associated with this change over.

(3) ADP Capital Equipment Maintenance ($75,000) - Increase reflects the need for additional maintenance contracts associated with maintaining both VAX and KL-10 equipment during transition.

(4) Contractual Service Contracts ($320,000) - Increase is based on cost escalation of contractual services.

(5) Capital Equipment ($300,000) - The increase in capital equipment from FY 1986 to FY 1987 is as follows:

	FY 1986 Request	FY 1987 Request
Central Information Management (ADP)		
VAX 8600 System	300	300
VAX Cluster Upgrade	75	150
Magnetic Disk Upgrade	0	80
Terminals and Microcomputers	30	0
IDM Upgrade	25	0
Classified System Upgrade	70	43
Communications Upgrade	0	100
Subtotal	500	673
Non-ADP		
Production Equipment	50	177
Total Capital Equipment	550	850

Justification for the above FY 1987 equipment items:

ADP - Central Information Management Upgrade ($673,000)

As indicated above, all applications on the DECSYSTEM KL-10 computers must be converted over to the VAX cluster. A VAX 8600 must be acquired and the existing VAX cluster upgraded to accommodate the KL-10 workload. The storage capability on the VAX cluster will be augmented to replace the storage capabilities of the

RP06 disk units on the KL-10 system and a second controller will be acquired to increase the fault tolerance of the cluster. Classified system must be upgraded with additional disk and tape drive capability. The communications upgrade will allow the local area network to be expanded to accommodate a greater number of users for access to OSTI computers as well as to the DOE-wide systems for bibliographic and numeric data. As the number of databases available on the system increases and more post-processing applications are made available, the number of users are expected to increase accordingly.

Non-ADP Equipment ($177,000)

The non-ADP funds will be used to replace old inefficient equipment. A folder ($45,000), perfect binder ($125,000), and plate burner ($7,000) will be acquired in order to increase production without additional labor costs and reduce maintenance costs.

The TIMP request of $14,698,000 will support the following activities:

(1) INTERNATIONAL INFORMATION EXCHANGE. TIMP has the lead in special bilateral technical information exchange agreements and programs of the International Energy Agency and the International Atomic Energy Agency. Technical information received through these programs lets DOE researchers review progress on similar or related work in other countries. This often permits them to cut costs or redirect their work in more promising directions.

(2) DEVELOPMENT OF POLICIES, PROCEDURES, AND GUIDELINES. TIMP must implement responsibilities under DOE Order 1430.1 so that the results of the Department's R&D program in the form of technical information is managed effectively.

(3) OVERSIGHT AND APPRAISAL. In order to assure that all research sites fulfill their contractual reporting responsibilities to DOE, TIMP is responsible for a Department-wide oversight and appraisal program.

(4) DEVELOPMENT OF THE ENERGY DATABASE (EDB). TIMP will continue to maintain a central database of energy science and research findings for DOE researchers.

(5) MANAGEMENT OF DEFENSE AND SENSITIVE TECHNICAL INFORMATION. TIMP will continue to maintain secured facilities and systems and qualified staff to manage and control the results of DOE classified R&D.

(6) MANAGEMENT OF DOE TECHNICAL RESEARCH RESULTS. As a result of its R&D effort, DOE disseminates research findings in over 25,000 original technical reports each year. TIMP has the responsibility to acquire these results, distribute them to the appropriate users, and then maintain effective access for future use as well as for historical program documentation. Records of this material as well as subject access are put in machine-readable files, and those of substantial technical value are added to the Energy Database. Over 32,000 DOE-funded publications including journal articles, monographs and conference proceedings are also accessible through its centralized

database system. To reduce costs, microfiches will be substituted in many cases for prime contractor R&D reports previously provided in full-size text.

(7) ACCESS TO UNCLASSIFIED ENERGY R&D RESULTS. TIMP provides access to the technical information it manages by subsetting the Energy Database (EDB) into 300 significant areas of science and technology corresponding to DOE's R&D program disciplines and then providing detailed subject access to EDB using over 24,000 specialized technical subject terms. TIMP has provided for online electronic access to the EDB through commercial vendors and to technical information management files via TIMP computers.

(8) DEVELOPMENT OF RESEARCH-IN-PROGRESS (RIP) DATABASES. The RIP database is DOE's central file on new and ongoing research programs and projects funded throughout the Department. Through computerized online access, this information is available in a timely manner. The availability of this information discourages unnecessary duplication in energy R&D. As a result of cooperative efforts with the Electric Power Research Institute (EPRI) as well as through interagency and bilateral international agreements, TIMP has been receiving notifications of non-DOE energy research in progress which are also being made available to DOE through online electronic access facilities. RIP databases now contain over 10,000 DOE energy project summaries and over 15,000 from other domestic organizations and foreign countries.

(9) MANAGEMENT OF THE TECHNICAL INFORMATION MONITORING SYSTEM (TIMS). TIMP operates an R&D contract monitoring and control system to help ensure that research contract deliverables are received by the Department and made available to appropriate audiences. The system utilizes information contained in the Department's procurement system (PADS) and the reporting requirements specified in individual contracts and grants and compares these requirements against the contract deliverables actually received at OSTI.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
POLICY AND MANAGEMENT - ENERGY RESEARCH
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Policy and Management - Energy Research Operating Expenses......	$ 530	$ 84	$ 84	$ 550	$+ 466
Total.....................	$ 530[a]	$ 84[a/b]	$ 84	$ 550[a]	$+ 466
Staffing Total FTE's.....	8	8	8	8	

[a] Totals reflect a reduction of $3,000 in FY 1985, $4,000 in FY 1986, and $5,000 in in FY 1987 for management initiative savings.

[b] Total reduced by $3,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings). Also, general reduction of $412,934 to be offset by use of prior years carryover.

Authorization: Section 209, P.L. 95-91.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
POLICY AND MANAGEMENT - ENERGY RESEARCH

(In thousands of dollars)

1986 Appropriation enacted..	$ 87
1986 Gramm-Rudman reduction..	- 3
1986 adjusted..	84
Program increases and decreases:	
o Funding required to maintain FTE level....................................	+ 466
1987 budget request	$ 550

TABLE 1
TIMP MANAGEMENT AND CONTROL SYSTEMS FOR THE RESULTS OF DOE INVESTMENT IN R&D

Program Control System	Purpose
Technical Information Management System (TIMS)	Provide DOE management with accountability information on contract deliverables.
	Ensure R&D results are reported to the control system.
Research-In-Progress (RIP)	Avoid unnecessary R&D spending by helping to ensure that new procurements do not overlap other research efforts (e.g. FE requires RIP search before any new procurements are made).
	Provide DOE programs with multi-use R&D data.
Policy Development	Reduce ineffective use of information resources (part of effective Information Resources Management as required by P. L. 96-511).
	Comply with laws, treaties, and executive and Departmental orders relating to research information.
Oversight and Program Evaluation	Ensure policy implementation for effective resource management.
DOE Archives for S&T	Provide economies of scale for cost-effective resource management (unique record of over 300,000 DOE reports; used in Defense Program (DP) classification review).
Energy Data Bases	Provide comprehensive access to state of knowledge to avoid duplicative R&D activities (over 2.3 million research records in energy science and technology).
	Provide intelligence base for analysis of other nations' state of the art in energy technologies in the interest of U.S. security as required by Executive Order 12333.
Energy Access and Dissemination Systems	Provide economies of scale and avoid waste by centralization (through online electronic access and current awareness bulletins).
International Information Management	Protect technology and assure favorable exchange when it is to U.S. advantage.
Industrial and Public Access to results of DOE R&D	Facilitate goals of technology transfer to U.S. industry (25,000 reports deposited annually at NTIS). Satisfy laws requiring taxpayer access.
Management and control of DOE Technical Reports	Ensure that contractors produce reproducible and usable products.
	Provide cost effective centralized control of publication distribution (meet requirement of OMB 1-16) for over 20,000 DOE technical reports.

Department of Energy

FY [illegible] Congressional Budget Request

Adjustments to FY [illegible] Appropriations

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Policy and Management - [illegible]										
Operating Expenses	$ [illegible]	$ [illegible]				[illegible]		[illegible]		[illegible]
Subtotal, Policy & Management	[illegible]	[illegible]				[illegible]		[illegible]		[illegible]
General Reduction	[illegible]	[illegible]								
Management Initiatives										
Pay Absorption										
Use of Prior Year Balances [illegible]										
Use of Prior Year Balances [illegible]										
Total, Policy & Management [illegible]	[illegible]	[illegible]				[illegible]		[illegible]		[illegible]

Policy and Management - Energy Research

The FY 1987 request for Policy and Management - Energy Research is $[illegible]. These funds are required to provide for personnel and other costs associated with continuation of eight full-time equivalents in the Office of the Director of Energy Research.

This staff directs the Office of Energy Research responsibilities carried out under the following specific programs: High Energy Physics; Nuclear Physics; Biological and Environmental Research; Magnetic Fusion Energy; Basic Energy Sciences; Energy Oversight; Research Analysis and University Support; Multiprogram Energy Laboratories-Facilities Support; and University Research Instrumentation.

In addition to directing the Office's research programs, the Director, Energy Research, also serves as the Department's principal science advisor in formulating basic research policy. In this capacity, the Director provides independent reviews, analyses and recommendations concerning a wide range of activities which require scientific counsel. These activities include, for example, national research and development strategies, plans and policies, including the establishment of budgetary priorities for energy research and development programs. They also include advising on policy issues regarding the best utilization of the Government's multipurpose laboratories assigned to Energy Research for oversight and management. These responsibilities are carried out through meetings with top management and program officials as necessary throughout the year; interactions with laboratories; presentations to the Energy Research Advisory Board; participation in Congressional hearings; and interactions with the scientific community. This staff is also responsible for implementing uniform systems and procedures for overall coordination and management of ER's continually increasing international activities which represent a significant workload and a very substantial investment of ER resources.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
NUCLEAR
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Policy and Management (NE)					
Operating expenses	$ 1,323[1]	$ 1,732[2]	$ 1,732	$ 1,810	$ +78
Total	$ 1,323	$ 1,732	$ 1,732	$ 1,810	$ +78
Staffing	31[3]	24	24	15	-9

Authorization: Section 31, P.L. 83-703

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[1] Reflects a reduction of $150,000 for management initiatives and $50,000 for Advanced Data Processing reductions.

[2] Adjustments to the FY 1986 appropriation are shown on the table on the following page.

[3] Reflects actual Full Time Equivalent (FTE) usage versus allocation of 24 FTE.

SUMMARY OF CHANGES
POLICY AND MANAGEMENT (NE)

(In thousands of dollars)

FY 1986 Budget Appropriation	$ 1,732
- Decrease of nine support personnel	-315
- Severance pay	+285
- Increase in computer support	+108
FY 1987 Budget Request	$ 1,810

Department of Energy
FY 1987 CONGRESSIONAL BUDGET REQUEST
(tabular dollars in thousands)
Policy and Management

Narrative Justification

The major change from FY 1986 to FY 1987 is the reduction of nine Full Time Equivalent's (FTE's). This action requires a reduction of support personnel with the corresponding savings in salaries and benefits. This reduction, however, is offset in part by required severance pay for these employees. A minimal increase in computer support is also required.

The objective of the Policy and Management activity is to provide adequate staffing and financial resources for the Assistant Secretary, Nuclear Energy (NE), and the supporting functions of policy development, plans formulation, resource management, and program assessment.

Staffing provides the technical and management expertise needed to direct and administer varied R&D and operational programs encompassing both civilian and defense activities. These efforts require the combined skills of technical managers, administrators, and clerical staff. The R&D activities encompass different technologies, at various stages of development, and are performed at different contractor locations to include national laboratories, universities, industrial concerns, and foreign governments. The operational activities involving uranium enrichment are also performed at decentralized locations. Defense activities include the Naval Reactors development program at Pittsburgh, Pennsylvania; Schenectady, New York; and Idaho Falls, Idaho.

The funding provides financial resources (i.e., salary, benefits, travel, etc.) to enable the Assistant Secretary and the office staff to perform the requisite functions of the organization. The required funds will permit performance of program and policy reviews at contractor or field office locations, interaction with the Congressional, OMB, and other Departmental elements, involvement with nuclear energy source selection boards, attendance at public meetings either sponsored by the Department or others, furtherance of employee development, and participation in the employment cycle. This latter effort includes invitational travel and change of station orders. With respect to change of station, the requested funds cover employee and family transportation costs, per diem costs, and temporary quarters costs. Computer acquisition and operations support are also covered.

FY 1986 Appropriation	Departmental Request
$ 1,732	$ 1,810

General Management: (7 FTE) This level supports positions required for the Assistant Secretary (AS), the principal Deputy Assistant Secretary (DAS) and their immediate staff.

Program Support: (8 FTE) Provides for staffing in the following principle areas.

> Plans and Evaluation: (4 FTE) Provides professional and clerical staff needed for the development of plans and strategy in the nuclear sector, the preparation of testimony and special correspondence, the analysis of legislation, and the coordination of the program planning efforts. The Office also supports computer acquisition and operation support. Although computer acquisition is nearing completion, the need to maintain this equipment and to produce software packages to optimize their application to a wide range of Nuclear Energy requirements results in increased near term funding.

Resource Management: (4 FTE) Supports such overall management activities as personnel, budget formulation, budget execution, administrative management of funds, procurement, and contract administration, business management, and program/project management, including major systems acquisition, cost estimating, and project reviews. Overall ASNE training is also supported.

The funding of $1,810,000 is comprised of $950,000 for personnel compensation, $100,000 for benefits, $285,000 for benefits for former personnel, $75,000 for travel, and $400,000 for contractual services for computer acquisition and support.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL REQUEST
LEAD TABLE
POLICY AND MANAGEMENT
Energy Supply Research and Development - Operating Expenses

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Approp.	FY 1986 Adj. Approp.	FY 1987 Base	FY 1987 Request	Request vs. Base
Energy Supply R&D					
Operating Expenses	$ 1,527	$ 1,681	$ 1,681	$ 1,527	-154
Total	$ 1,527	$ 1,681	$ 1,681	$ 1,527	-154
Staffing Total FTEs	19	14	14	14	0

Authorization: Section 209 P.L. 95-91, "Department of Energy Organization Act."

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
POLICY AND MANAGEMENT
(in thousands of dollars)

FY 1986 Adjusted Appropriation.. $1,[illegible]

Reduced level of support.. -150

FY 1987 Congressional Request... $1,[illegible]

Policy and Management.. $1,[illegible],000

The Policy and Management FY 1987 Congressional Request is $1,[illegible],000 and [illegible] full time equivalent staff years of effort which provides for overall management guidance to Conservation and Renewable Energy (CE) programs. Staffing levels provide the executive and overall program direction for all CE programs to provide effective management. These activities include executive management, policy formulation, program review and approval, and liaison with senior officials in DOE, White House, Congressional, OMB, other Departmental Agencies, private industry, and State and local governments. In addition, the staff will carry out analyses of the CE programs needed to assess performance and effectiveness.

The FY 1987 request also provides for the support for functions such as planning, policy development and analysis, program planning and evaluation, budget preparation and execution, program and personnel management and administrative support performed in the Offices of the Assistant Secretary and Policy and Management. Activities performed include development of planning guidance, analysis of program options for achieving planned objectives, evaluation of performance against program objectives, reporting and/or coordination of program/budget submissions and execution of approved budgets and ongoing support functions in the areas of: administrative services, procurement, personnel, space management and related support services. In addition, funds are included for the continuation of a procurement tracking system and an automated support system which provides word processing, electronic mail, data base management, communication and other program applications.

[illegible]

[illegible]

Congressional Budget Request

General Science and Research
Uranium Enrichment
Geothermal Resources Development Fund

Volume 6

FY 1987

U.S. Department of Energy
Assistant Secretary,
Management and Administration
Office of the Controller
Washington, D.C. 20585

February 1986

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	Gramm-Rudman-Hollings	Total
Policy and Management - (NE)			
Operating Expenses	$1,800	$-68	$1,732
Subtotal, Policy & Management (NE)	$1,800	$-68	$1,732
Operating	$1,800	$-68	$1,732

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Conference	General Reduction	Pay Cost Restoration	FTE General Reduction	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
Policy and Management - (CE) [illegible]								
Operating Expenses	$1,800	$ -41	$ -51	$ -18	$ -60	$1,630	$ 51	$1,681
General Reduction	-41	+41	---	---	---	---	---	---
FTE Reduction	-18	---	---	18	---	---	---	---
Pay Restoration	-51	---	51	---	---	---	---	---
Use of Prior Year Balances (PBP,CE)	51	---	---	---	---	51	-51	---
Total, Policy & Management (CE)	$1,741	$ ---	$ ---	$ ---	$ -60	$1,681	$ ---	$1,681

DEPARTMENT OF ENERGY
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
URANIUM ENRICHMENT
GEOTHERMAL RESOURCES DEVELOPMENT FUND
VOLUME 4

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DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1985 Actual BA	FY 1986 Estimate BA	FY 1987 Request BA
Appropriations Before The Energy and Water Development Subcommittees:			
Energy Supply Research and Development	1,967,490	1,696,298	1,254,162
Uranium Enrichment	237,956	190,512	---
General Science and Research	724,860	655,928	773,400
Atomic Energy Defense Activities ..	7,322,321	7,231,664	8,230,000
Departmental Administration	128,602	150,319	151,082
Alaska Power Administration	3,233	3,245	2,881
Bonneville Power Administration ...	284,771	330,000	276,100
Southeastern Power Administration .	35,744	---	19,647
Southwestern Power Administration .	31,208	29,191	25,337
Western Area Power Administration .	218,230	195,910	240,309
Western Area Power Emergency Fund .	---	---	---
Federal Energy Regulatory Commission	54,543	41,989	20,325
Nuclear Waste Fund	327,669	499,037	769,349
Geothermal Resources Development Fund	121	69	72
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	$11,336,748	$11,024,162	$11,762,664

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1985 Actual BA	FY 1986 Estimate BA	FY 1987 Request BA
Appropriations Before Interior and Related Agencies Subcommittees:			
Alternative Fuels Production	$ 1,169,895	$ ---	$ ---
Clean Coal Technology	---	---	---
Fossil Energy Research and Development	289,048	311,954	82,767
Naval Petroleum and Oil Shale Reserves	156,874	13,002	127,108
Energy Conservation	457,436	427,512	39,433
Energy Regulation	27,139	23,423	21,850
Emergency Preparedness	6,045	5,750	6,044
Strategic Petroleum Reserve	2,049,550	107,533	---
Energy Information Activities	60,919	57,724	59,651
Subtotal, Interior and Related Agencies Subcommittees	4,216,906	946,898	336,853
Subtotal, Energy and Water Development Subcommittees	11,336,748	11,024,162	11,762,664
Subtotal, Department of Energy	15,553,654	11,971,060	12,099,517
Permanent - Indefinite Appropriations:			
Payments to States	1,052	570	570
Total, Department of Energy	$15,554,706	$11,971,630	$12,100,087

DEPARTMENT OF ENERGY
F Y 1987 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
ENERGY & WATER SUBCOMMITTEE				
HEADQUARTERS	4,865	4,965	-18	4,947
FIELD	9,133	9,185	111	9,296
SUBCOMMITTEE TOTAL	13,998	14,150	93	14,243
INTERIOR SUBCOMMITTEE				
HEADQUARTERS	1,353	1,304	-166	1,138
FIELD	907	896	-226	670
SUBCOMMITTEE TOTAL	2,260	2,200	-392	1,808
GRAND TOTAL	16,258	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,258	16,218	-497	15,721

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
10:ENERGY SUPPLY RESEARCH AND DEV	937	934	-34	900
HEADQUARTERS	811	820	-28	792
FIELD	126	114	-6	108
15:URANIUM ENRICHMENT	69	66	1	67
HEADQUARTERS	58	55	1	56
FIELD	11	11	0	11
20:GENERAL SCIENCE AND RESEARCH	37	39	0	39
HEADQUARTERS	37	39	0	39
25:ATOMIC ENERGY DEFENSE ACTIVITI	2,618	2,702	131	2,833
HEADQUARTERS	496	518	9	527
FIELD	2,122	2,184	122	2,306
30:DEPARTMENTAL ADMINISTRATION	3,307	3,332	-5	3,327
HEADQUARTERS	1,721	1,726	0	1,726
FIELD	1,586	1,606	-5	1,601
34:ALASKA POWER ADMINISTRATION	37	38	0	38
FIELD	37	38	0	38
36:BONNEVILLE POWER ADMIN	3,510	3,480	0	3,480
FIELD	3,510	3,480	0	3,480
38:SOUTHEASTERN POWER ADMIN	38	40	0	40
FIELD	38	40	0	40
42:SOUTHWESTERN POWER ADMIN	186	186	0	186
FIELD	186	186	0	186
46:WESTERN AREA POWER ADMIN	1,181	1,160	0	1,160
FIELD	1,181	1,160	0	1,160
50:WAPA - COLORADO RIVER BASIN	219	219	0	219
FIELD	219	219	0	219
52:FEDERAL ENERGY REGULATORY COMM	1,617	1,659	0	1,659
HEADQUARTERS	1,617	1,659	0	1,659
54:NUCLEAR WASTE FUND	238	292	0	292
HEADQUARTERS	123	147	0	147
FIELD	115	145	0	145
56:GEOTHERMAL RESOURCES DEV FUND	2	1	0	1
HEADQUARTERS	2	1	0	1
65:FOSSIL ENERGY RESEARCH AND DEV	714	700	-161	539
HEADQUARTERS	151	135	-26	109
FIELD	563	565	-135	430
70:NAVAL PETROL & OIL SHALE RES	104	104	-9	95
HEADQUARTERS	23	23	0	23
FIELD	81	81	-9	72
75:ENERGY CONSERVATION	333	352	-134	218
HEADQUARTERS	208	227	-79	148
FIELD	125	125	-55	70
80:EMERGENCY PREPAREDNESS	74	71	0	71
HEADQUARTERS	74	71	0	71
81:ECONOMIC REGULATION	377	340	-50	290
HEADQUARTERS	377	340	-50	290
85:STRATEGIC PETROLEUM RESERVE	178	152	-32	120
HEADQUARTERS	40	27	-5	22
FIELD	138	125	-27	98
90:ENERGY INFORMATION ACTIVITIES	480	481	-6	475
HEADQUARTERS	480	481	-6	475
94:ADVANCES FOR CO-OP WORK	2	2	0	2
FIELD	2	2	0	2
GRAND TOTAL	16,258	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,258	16,218	-497	15,721

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

GENERAL SCIENCE AND RESEARCH

VOLUME 4

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DEPARTMENT OF ENERGY

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General Science and Research Activities

(Including Transfer of Funds)

For expenses of the Department of Energy, activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for general science and research activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed [13] 12 for replacement only); [$691,400,000] $773,400,000, to remain available until expended [of which $6,000,000 shall be derived by transfer from Operation and Maintenance, Southeastern Power Administration]. (Public Law 99-141, making appropriations for energy and water development, 1986.)

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

GENERAL SCIENCE AND RESEARCH

(Budget Authority in thousands of Dollars)

	FY 1985 Actual	FY 1986 Estimate	FY 1987 Request
High Energy Physics	$541,915	$494,858	$546,700
Nuclear Physics	181,440	164,472	224,200
High Energy and Nuclear Physics Program Direction	2,205	2,092	2,500
Subtotal, General Sciences	725,560	661,422	773,400
Transfer of Appropriation	-700	-6,000	---
Less Use of Prior Year Balances and Other Adjustments	---	506	---
Total, General Science and Research.	$724,860	$655,928	$773,400

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW
HIGH ENERGY AND NUCLEAR PHYSICS
GENERAL SCIENCE AND RESEARCH
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
High Energy Physics					
Physics Research					
Operating Expenses..	$106,300	$106,268	$106,268	$118,600	$+12,332
Subtotal...........	106,300	106,268	106,268	118,600	+12,332
Facility Operations					
Operating Expenses..	172,715	175,095	175,095	213,400	+38,305
Capital Equipment...	58,700	69,984	69,984	77,500	+ 7,516
Construction........	114,000	55,049	55,049	41,700	-13,349
Subtotal...........	345,415	300,128	300,128	332,600	+32,472
High Energy Technology					
Operating Expenses..	90,200	88,462	88,462	95,500	+ 7,038
Subtotal...........	90,200	88,462	88,462	95,500	+ 7,038
Total					
Operating Expenses..	369,215[a/]	369,825	369,825	427,500	+57,675
Capital Equipment...	58,700	69,984	69,984	77,500	+ 7,516
Construction........	114,000	55,049	55,049	41,700	-13,349
Total High Energy Physics..............	$541,915[a/][b/][c/]	$494,858[c/][d/][e/]	$494,858	$546,700[c/]	$+51,842
Nuclear Physics (NP)					
Medium Energy Nuclear Physics					
Operating Expenses..	$ 73,810[f/]	$ 73,131	$ 73,131	$ 85,000	$+11,869
Subtotal..........	73,810	73,131	73,131	85,000	+11,869
Heavy Ion Nuclear Physics					
Operating Expenses..	49,008	50,150	50,150	63,700	+13,550
Subtotal..........	49,008	50,150	50,150	63,700	+13,550
Low Energy Nuclear Physics					
Operating Expenses..	13,322	12,087	12,087	15,700	+ 3,613
Subtotal..........	13,322	12,087	12,087	15,700	+ 3,613
Nuclear Theory					
Operating Expenses..	9,300	8,999	8,999	10,500	+ 1,501
Subtotal..........	9,300	8,999	8,999	10,500	+ 1,501
Capital Equipment.....	12,700	13,403	13,403	16,000	+ 2,597
Construction..........	23,300	6,702	6,702	33,300	+26,598
Total					
Operating Expenses....	145,440[g/]	144,367	144,367	174,900	+30,533
Capital Equipment.....	12,700	13,403	13,403	16,000	+ 2,597
Construction..........	23,300	6,702	6,702	33,300	+26,598
Nuclear Physics.....	$181,440[h/][i/]	$164,472[i/][k/][m/]	$164,472	$224,200[i/]	$+59,728

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
General Science Program Direction					
Operating Expenses..	$ 2,205[n]	$ 2,092[n][p]	$ 2,092	$ 2,500[n]	$ + 408
Program Direction.....	2,205	2,092	2,092	2,500	+ 408
Total					
Operating Expenses..	$516,860	$516,284	$516,284	$604,900	$+88,616
Capital Equipment...	71,400	83,387	83,387	93,500	+10,113
Construction.........	137,300	61,751	61,751	75,000	+13,249
Subtotal General Science and Research........	$725,560	$661,422	$661,422	$773,400	$+111,978
Transfer of Appropriation.......	0	- 6,000	0	0	0
General Science and Research............	$725,560	$655,422	$661,422	$773,400	$+111,978
Staffing Total FTE's..	37	39	39	39	0

Authorization: Section 209, P.L. 95-91

[a] FY 1985 total does not include $3,720,000 transferred to the SBIR program.

[b] FY 1985 total reflects an ADP general reduction of $2,165,000.

[c] Totals reflect a reduction of $4,000,000 in FY 1985, $7,500,000 in FY 1986 and $8,000,000 in FY 1987 for management initiative savings.

[d] FY 1986 total reduced by 22,042,000 in accordance with P.L. 99-117, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

[e] $200,000 has been transferred to the Assistant Secretary for Environmental Safety and Health.

[f] Includes $3,100,000 Defense Programs support of Clinton P. Anderson Meson Physics Facility (LAMPF) operations.

[g] Total does not include $1,425,000 transferred to the SBIR program.

[h] FY 1985 total reflects an ADP general reduction of $835,000.

[i] Totals reflect a reduction of $1,300,000 in FY 1985, $2,500,00 in FY 1986, and $2,700,00 for management initiative savings.

[k] Total reduced by $7,328,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

[m] $100,000 has been transferred to the Assistant Secretary for Environmental Safety and Health.

[n] Totals reflect a reduction of $5,000 in FY 1985, $15,000 in FY 1986, and $25,000 in FY 1987 for management initiative savings.

[p] Total reduced by $102,000 in accordance with P.L. 99-117, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

High Energy and Nuclear Physics

The Department's General Science programs are concerned with basic research to discover and understand the fundamental constituents of matter and energy and the basic forces in nature. Understanding of the laws of nature and the basic components from which matter and energy, in all their varied forms are composed, forms the foundation upon which all of modern science and technology rests. Deeper understanding correspondingly contributes, sometimes in spectacular ways, to all scientific disciplines and to our Nation's technological base. History has shown that this type of basic research has significant long-term benefits. For example, the discovery of both nuclear fission and nuclear fusion resulted earlier in the century from this kind of basic research. This Department, and its predecessor agencies, has a history of effectively building, managing and operating the large, high technology facilities which are essential for the conduct of research in high energy physics and in nuclear physics. The Department serves as the lead agency for these programs.

The Department's General Science programs are organized into two interrelated scientific programs, High Energy Physics and Nuclear Physics. While these programs are not directly associated with energy technology in the near or mid-term, they support basic research whose aim is to provide new knowledge which will have long-term scientific and technological impacts on energy development and utilization, and on other aspects of our society. The salaries, benefits and associated costs of the staff of the High Energy Physics and Nuclear Physics programs are also included in the General Science category as a separate program, called General Science Program Direction.

Matter is made up of substances known as the chemical elements. The smallest distinguishable unit of an element is the atom. Within the atom, there is a central part called the nucleus which contains most of the mass of the atom. The constituents of the nucleus, neutrons and protons, along with the mesons which play a key role in the nuclear force, are now believed to be made up of elementary particles, called quarks. The Nuclear Physics program strives to attain an understanding of the structure and properties of atomic nuclei and the forces governing their motion and interactions at the most elementary level possible. The High Energy Physics program is an exploratory field of basic research which strives to reach the ultimate description of matter and energy through discovering and studying the properties of the most basic constituent building blocks of matter (such as quarks), the nature and relationship of the four known basic forces acting among them, and the most elemental transformations between energy and matter. In recent years outstanding progress has been made toward the unification of the forces of nature and toward understanding the ultimate structure of matter in terms of basic constituent quarks and leptons. In achieving these levels of knowledge, United States high energy physicists have won or shared in three Nobel prizes during the last six years.

A major current objective of High Energy Physics is the conceptual unification of the basic forces into a single comprehensive theoretical framework. Part of the recent great progress in science has been a reduction in the apparent number of basic forces through the conceptual unification of the weak nuclear and electromagnetic forces into what is now called the electroweak force. The recent experimental evidence for the existence of the W and Z^0 particles, together with experimental discoveries during the past decade of neutral weak currents and of particles with charmed quark and even heavier quark constituents, all support this conceptual unification. The electromagnetic and weak nuclear forces can now be viewed in a natural way as different aspects of one electroweak force. There is now increasing anticipation that the unification of the strong nuclear and electroweak forces into one "grand unified" force may be possible, thereby reducing the apparent number of basic forces in nature to only two. The ultimate goal is to incorporate the gravitational force, also, which would bring all basic forces into a single unified framework. Exactly what will follow from the various stages of unification cannot be predicted in any detail. One can certainly, however, anticipate profound impacts analogous to those which followed the unification of electricity and magnetism by Maxwell late in the 19th century, and the unification of matter and energy by Einstein early in this century. The basic experimental technique used is to study the results of violent collisions of very high energy particles in a high energy beam with the fixed target or with particles or antiparticles in a second high energy beam. In these collisions many entirely new forms of matter can be created in energy/matter interchanges. The study of these reaction products reveals properties of the underlying building blocks and basic forces involved.

The Nuclear Physics program is a comprehensive program of interdependent experimental and theoretical investigations of atomic nuclei. The program's goals include an understanding of the fundamental forces of nature within nuclei using the variety of nuclei available to attack specific problems unaddressable in simpler systems. The Nuclear Physics experimental program depends upon the operation of large and complicated accelerator facilities which provide a variety of projectile beams required for forefront nuclear research. Not only are many of the experimental and theoretical tools similar to those of High Energy Physics, but also the progress in the two fields interact synergistically. For example, developments in understanding of the laws of nature and theoretical projections have led to development of a new theoretical framework, quantum chromodynamics (QCD), which now provides the fundamental basis of our understanding of the strong nuclear force. Experiments with nuclei will allow comprehensive tests of this theoretical development and will provide guidance for future development of the theory into extended systems.

The General Science programs support a few large accelerator and colliding beam facilities which are available to all qualified scientists on the basis of the merit of their scientific proposals. More than 75% of the research in high energy physics is done by collaborative groups of university-based scientists. Proposals from university and laboratory user groups for accelerator research time are evaluated by scientific program committees which recommend those proposals with the greatest scientific promise. The High Energy Physics program operates almost exclusively in this mode, while Nuclear Physics, in addition to such national facilities, also supports dedicated accelerator facilities located on the campuses of four leading universities. To complement, interpret, and guide the experimental work, each program supports a vigorous theoretical research effort at universities and at the national laboratories.

The U.S. has been the world leader in science and technology and has derived many economic benefits from that leadership. The Department of Energy and its multiprogram laboratories play an important role in the nation's scientific enterprise that is essential for our preeminence. A central feature of this role has been the construction and operation of large, specialized scientific facilities that are used by scientists from universities and industry as well as the national laboratories. Many of the scientific facilities in our multiprogram laboratories are old or are becoming old and their scientific productivity will soon become marginal. In order to make further progress in certain fields, new, more powerful facilities are required.

In the past few years, the Department has given special attention to correcting deficiencies at its laboratories in environment, health, safety, security, safeguards, multiprogram general purpose facilities and other such areas. However, less attention has been paid to improving the essential scientific facilities required to accomplish the main scientific mission of the laboratories, i.e., preeminence in certain key fields of research. Three facilities that have been identified by the scientific community as being the most critical to the future needs of the Department's basic research programs are: 1-2 GeV Synchrotron Radiation Source - Lawrence Berkeley Laboratory; 6 GeV Synchrotron Radiation Source - Argonne National Laboratory; and Advanced Steady State Research Reactor - Oak Ridge National Laboratory. One is needed for advances in the area of General Science: a relativistic heavy ion collider for nuclear physics.

Program Highlights

A major feature of the High Energy Physics program in FY 1987 will be the first operation for research of the Tevatron proton-antiproton colliding beam capability at Fermilab and of the Stanford Linear Collider (SLC) electron-positron collider at SLAC. Both of these provide world forefront capabilities for the U.S. An important goal in FY 1987 is to bring these facilities into operation for research. The program will also include operation and research utilization of the fixed target program at Fermilab, the Alternating Gradient Synchrotron (AGS) at Brookhaven National Laboratory including its unique high energy polarized proton beam, and the Positron-Electron Project (PEP) and SPEAR colliding beam program at SLAC. The request provides support for participation by university based groups in experimental research including accelerator user group efforts and non-accelerator experiments, and for theoretical research efforts. The FY 1987 program also includes funding for a continuation of advanced technology research and development, for both accelerators and detectors.

The capital equipment request for High Energy Physics in FY 1987 gives special emphasis to meeting the highest priority needs for detectors to use the major new capabilities being provided by the Tevatron I proton-antiproton collider at Fermilab and by the SLC electron-positron collider at SLAC. The equipment request for FY 1987 is essential to make it possible for these new detectors to be completed by FY 1989 and thereby permit more effective utilization of the new U.S. High Energy Physics facilities now being completed at Fermilab and at SLAC. Implementation of the research programs at these new facilities without undue delay is critical to the strength of the U.S. High Energy Physics program for the remainder of the 1980's and early 1990's.

The construction request for FY 1987 provides for continuation of the Fermilab computing upgrade and the AGS Accumulator/Booster at BNL; completion of the SLC and Tevatron I projects and an approximately constant level of AIP and GPP.

In FY 1987, Nuclear Physics national facilities are expected to be operated at approximately the same level as FY 1985 and slightly above the level projected for FY 1986. In late FY 1986, the Tandem/AGS Heavy Ion Transfer Line construction project at Brookhaven National Laboratory (BNL) will be completed. In FY 1987, research programs will be initiated which utilize this facility to study relativistic heavy ion collisions, in a previously inaccessible energy regime. The Transfer Line couples the BNL Tandem and Alternating Gradient

Synchrotron (AGS) accelerators to provide heavy ion beams up to energies of 14 billion electron volts per atomic mass unit (GeV/AMU) for atomic nuclei up to sulfur (32 AMU). This AGS/Tandem facility will provide heavy ion beams more energetic than have been previously available anywhere in the world, and will create conditions which ultimately may lead to exotic new states of nuclear matter which have never before been observed in the laboratory.

In nuclear theory, FY 1987 will see much activity directed at questions of how quarks, gluons, and their interactions determine the makeup and behavior of nuclei. Experimentalists, as well as theorists, will continue to be involved in a variety of internationally cooperative research programs including solar neutrino studies, relativistic heavy ion experiments, and low energy antiproton interactions. In FY 1987, research at Brookhaven National Laboratory supporting the future design of a relativistic heavy ion collider will also be continued.

The highest priority for new construction in basic nuclear research in the United States is the Continuous Electron Beam Accelerator Facility (CEBAF). Construction will be initiated in FY 1987 and supporting research and development for this facility will continue. CEBAF will be a major facility centering on an electron linear accelerator complex capable of delivering intense, continuous beams in the energy range from 500 to 4,000 MeV. CEBAF's combination of continuous beam, high intensity, and high energy, incorporating the most modern technologies, will provide a unique world-class research facility. Research at the facility will address a crucial class of problems facing nuclear physics to provide the correlation and transition between the traditional and emerging descriptions of nuclear dynamics. The goal is to synthesize into a unified description the traditional picture of nuclei--based on nuclear and mesonic degrees of freedom--and developing understanding which incorporate the underlying structure of quarks and gluons.

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

GENERAL SCIENCE AND RESEARCH

HIGH ENERGY PHYSICS

VOLUME 4

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DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
HIGH ENERGY PHYSICS
GENERAL SCIENCE AND RESEARCH

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
High Energy Physics					
Physics Research					
Operating Expenses..	$106,300	$106,268	$106,268	$118,600	$+12,332
Subtotal...........	106,300	106,268	106,268	118,600	+12,332
Facility Operations					
Operating Expenses..	172,715	175,095	175,095	213,400	+38,305
Capital Equipment...	58,700	69,984	69,984	77,500	+ 7,516
Construction........	114,000	55,049	55,049	41,700	-13,349
Subtotal...........	345,415	300,128	300,128	332,600	+32,472
High Energy Technology					
Operating Expenses..	90,200	88,462	88,462	95,500	+ 7,038
Subtotal...........	90,200	88,462	88,462	95,500	+ 7,038
Total					
Operating Expenses..	369,215[a]	369,825	369,825	427,500	+57,675
Capital Equipment...	58,700	69,984	69,984	77,500	+ 7,516
Construction........	114,000	55,049	55,049	41,700	-13,349
Total High Energy Physics..............	$541,915[a][b][c]	$494,858[c][d][e][f]	$494,858	$546,700	$+51,842
Staffing					
FTP/Total FTEs.......	(Reference General Science Program Direction Decision Unit)				

Authorization: Section 209, P.L. 95-91

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[a] FY 1985 total does not include $3,720,000 transferred to the SBIR program.

[b] FY 1985 total reflects a reduction of $2,165,000 for ADP general reduction.

[c] Totals reflect a reduction of $4,000,000 in FY 1985, $7,500,000 in FY 1986 and $8,000,000 in FY 1987 for management initiative savings.

[d] FY 1986 total includes $6,000,000 transfer of appropriation.

[e] FY 1986 total reduced by $22,042,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

[f] $200,000 has been transferred to Assistant Secretary for Environmental Safety and Health.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
HIGH ENERGY PHYSICS
(In thousands of dollars)

1986 Appropriation enacted	$516,900
1986 Gramm-Rudman reduction	- 22,042
1986 adjusted	$494,858
o Funding required to maintain constant level of program activity	+ 29,692
o Substantial increase in facility operations funding - First operation of two new world-class HEP facilities -- Tevatron collider - world's highest energy proton-antiproton collider -- SLC - world's highest energy electron-positron collider - Reduced operation of other HEP accelerator capabilities - Average facility utilization near the 50% level	+ 27,790
o Physics research at a level consistent with the operating level of facilities	+ 5,960
o Continuation of advanced technology R&D for accelerators and detectors	+ 1,730
o Capital equipment, with special emphasis on needs at Fermilab for Tevatron I detectors and at SLAC for SLC detector	+ 3,320
o Construction at reduced level of effort - Continuation of Fermilab Central Computing Upgrade (+11,000) - Continuation of construction on AGS Accumulator/Booster (+1,470) - AIP & GPP at about constant level of effort (+1,500) - Reduced requirements for construction of Tevatron I and SLC in FY 1986 (-30,620)	- 16,650
1987 budget request	$546,700

High Energy Physics

The High Energy Physics program supports basic research which seeks to discover the fundamental constituents of matter and to understand the laws of nature that govern the behavior of matter and energy. Past discoveries and new understanding resulting from these activities have helped lay the foundation for much of the highly technological world in which we live.

The Department of Energy provides over 90% of the Federal support for this most basic scientific endeavor, and serves as Executive Agent for the national program. The Department has responsibility for planning for the national program, with the goals of achieving a forefront and productive program and maintaining a competitive world leadership position for the United States.

During this century, the forefront of scientific investigation has advanced to studies of ever more fundamental constituents of matter, from research on molecules to research on atoms, atomic nuclei, the constituents of nuclei (protons and neutrons), and recently on even more elemental objects called quarks and leptons. The framework for understanding all natural phenomena has rested on the belief that they can be described in terms of four fundamental forces and a small set of basic constituents of all matter. The "electromagnetic" force describes how atoms are formed from nuclei and electrons and how molecules are formed from atoms, and is the cornerstone to understanding the periodic table of elements, chemistry, electronic communication and biological processes. The "weak nuclear" force describes processes such as the radioactive decay of unstable nuclei and the interactions of neutrinos. The "strong nuclear" force describes how the sun and stars produce so much energy and, together with the weak nuclear force, explains the relative abundances of the chemical elements. The "gravitational" force describes falling objects, orbiting celestial bodies, the formation of black holes, and the large scale features of the universe such as the clustering of galaxies.

One facet of the recent great progress in science has been the conceptual unification of the weak nuclear and electromagnetic forces into a single force -- the electroweak force. Recent conclusive experimental evidence for the existence of the W and Z particles, the carriers of the weak force, together with the earlier discoveries of weak neutral currents and of particles with heavy quark constituents, confirm major predictions of this conceptual unification. The electromagnetic and weak nuclear forces can now be viewed in a natural way as different aspects of a single electroweak force. The 1979 Nobel Prize in Physics was awarded to three theoretical high energy physicists (including S. Glashow and S. Weinberg from the U.S.) for their work toward this unification. The experiment at CERN in which the W and Z particles were discovered, and for which C. Rubbia and S. Van der Meer received the 1984 Nobel Prize in Physics, included DOE-supported U.S. participants. Recent experimental evidence contains tantalizing hints that may signal a breakthrough to new physics beyond the electroweak unification, and could shed light on the mechanism responsible for the unification.

There is now a theory of the strong nuclear force, called quantum-chromodynamics, which is based on the same principles as the electroweak theory. As a result there is strong anticipation that the unification of the strong nuclear and electroweak forces into one "grand unified" force is possible, reducing the number of basic types of force in nature to two. The picture of nature which is presented in terms of the unified electroweak force, quantum chromodynamics, and the quark and lepton constituents is called the Standard Model.

The enormous energy scale at which grand unification is anticipated to occur can be derived from basic theoretical techniques for whose development the 1982 Nobel Prize in Physics was awarded to K. Wilson, a U.S. theoretical physicist. The ideas involved in grand unification can be used to give possible explanations for the observed excess of matter relative to antimatter in our universe. Other possibilities arising from grand unification models are that protons, which were previously thought to be absolutely stable, may eventually decay; that neutrinos, which were previously thought to be massless, may in fact have a mass; and that isolated magnetic poles of enormous mass (perhaps a billion times that of a proton) may exist. The 1980 Nobel Prize in Physics was awarded to two U.S. high energy physicists, J. Cronin and V. Fitch, for experimental research which indicated that certain elemental processes are not exactly reversible. This lack of exact reversibility, together with the mechanism involved in proton decay, may be combined to explain the observed excess of matter relative to antimatter in the universe. Special emphasis in the high energy physics experimental program is focused on testing various predictions of the grand unified theories. Any verification of these predictions by the experiments currently in progress would be a truly major scientific breakthrough.

These new concepts also have profound implications for astrophysics, where they help provide an understanding of how the universe evolved from the postulated primordial big bang to its present state, and whether the universe will expand forever or perhaps contract again in the distant future to another fireball. Interesting scenarios of the early expansion of the universe are being formulated which outline possible explanations to account for the matter, energy and disorder in the universe. Recent discoveries and planned investigations in high energy physics provide crucial experimental input to these developments.

The ultimate goal of this type of research is to incorporate the gravitational force into the framework of unification, thereby bringing all of the basic forces into a single unified framework. Exactly what new insight will follow from the various stages of unification cannot be predicted in any detail. However, one can certainly anticipate profound changes in the way we think about matter and energy and the physical universe, and this in turn will result in many changes and benefits analogous to those which followed the unification of electricity and magnetism by Maxwell late in the 19th century and the unification of matter and energy by Einstein early in this century.

Progress in high energy physics research is based on a complex and continuing interplay of advances in experiment, theory and technology. Each of these areas is strongly dependent for its progress on the advancement of the other two. High energy physics experiments expand the horizons of theoretical and technical knowledge, and the range of possible experiments is determined by technological as well as conceptual capabilities and limitations. Physicists frequently have to invent new and unique apparatus and novel techniques in order to carry out the experiments of greatest interest, thereby contributing directly to the advanced technological resources of the country.

To probe into the depths of matter -- into the domain of quarks, gluons, and other new particles -- it is most effective to use intense beams of very energetic particles, which are only available from high energy particle accelerators. By studying the results of the violent collisions of these accelerated particles with other particles, in a dense fixed target or in another beam of high energy particles, information is acquired about the constituents of the particles, about the forces which act within and between them, and about the transformations which occur between matter and energy.

The high energy particle accelerator and colliding beam facilities to be operated by the Department in FY 1987 include: the Tevatron collider at the Fermi National Accelerator Laboratory (Fermilab) providing 900 GeV on 900 GeV proton-antiproton collisions; the SLC collider at the Stanford Linear Accelerator Center (SLAC) providing 50 GeV on 50 GeV electron positron collisions; the Tevatron superconducting magnet proton synchrotron at Fermilab providing proton beams of about 800 GeV and numerous secondary beams for fixed target experiments; the 50 GeV linear electron accelerator at SLAC providing injected beams for the PEP storage ring (15 GeV on 15 GeV) and for the SPEAR storage ring (4 GeV on 4 GeV), in addition to the-SLC mentioned above; and the 30 GeV proton synchrotron, the Alternating Gradient Synchrotron (AGS), at Brookhaven National Laboratory (BNL). Each of these DOE accelerator centers provides a unique set of experimental research capabilities, complementary to the others. As an ensemble they provide the foundation for a comprehensive forefront national program in high energy physics research.

A major part of the funding of the high energy physics program is required to meet the direct needs of the accelerator laboratories to develop, maintain and operate the major accelerator, colliding beam and detector facilities. The facilities at these laboratories provide the primary source of experimental data for high energy physics research in this country; about 75% of this research is carried out by university-based scientists. In this sense, most of the funding provided to the accelerator laboratories also can be considered as necessary indirect support to the university research programs.

At Fermilab, the world's first superconducting high energy accelerator has routinely operated, delivering 800 GeV protons to serve a number of fixed target experiments. The Tevatron I project, which provides the capability for operating the superconducting synchrotron as a 900 GeV on 900 GeV proton-antiproton colliding beam storage ring, is scheduled for first operation for research late in FY 1986. The Tevatron I has already had a successful pre-operating test. The Tevatron II project, scheduled for completion in FY 1986, provides a number of new and upgraded secondary beam enclosures and experimental halls for the fixed target research programs. Many of the capabilities provided by Tevatron II are already in operation.

At SLAC, the principal emphasis in recent years has been the systematic study of electron-positron collisions at center of mass energies between 3 GeV and 30 GeV. An important extension of this capability will be provided by the Stanford Linear Collider (SLC), which is to commence operation for research in FY 1987. This project has as a major goal the development and demonstration of the fundamental technical feasibility of using linear accelerators with precisely controlled, high intensity, micron-sized beam pulses to provide a reliable source of high luminosity electron-positron collisions. The successful demonstration of the SLC capabilities will be a major achievement in advanced accelerator technology and a critical early step toward a new generation of electron-positron colliders at energies well beyond those which would be considered feasible with circular colliders. Successful operation of the SLC in FY 1987 will also provide access to a previously unexplored physical domain, giving the first opportunity to study the scientifically important physics made possible by the anticipated copious production of the Z^0 boson in these high energy electron-positron collisions at energies near 100 GeV.

At BNL, the research program will make use of the recently developed unique capability for accelerating high energy polarized protons in the energy range up to 26 GeV, and also of new and upgraded secondary beam lines and detectors for a new generation of rare K-decay experiments which will test certain important theoretical predictions.

The SLC and Tevatron colliders will provide forefront research facilities for the next several years. By the mid 1990's, however, the U.S. High Energy Physics program will need new accelerator capabilities if it is to remain at the scientific frontier. Although electron-positron linear colliders show promise for the future, the technologies required for a significant step forward in energy and luminosity need much development and such a machine is not expected to be practical for at least 15 to 20 years. By contrast, the technology for a very high energy superconducting proton-proton collider is in hand and such a machine is the logical next step in the program.

Thus R&D efforts for the future of the high energy physics program are being focused on a large proton-proton collider with an energy of 20 TeV (trillion electron volts) per beam and high luminosity, up to $10^{33}\text{cm}^{-2}\text{sec}^{-1}$. Recent rapid progress in particle physics, including the discovery of the W and Z particles, has emphasized the importance of experiments in the mass range up to several TeV where new phenomena are expected, including new forms of matter with unique properties. Although the Standard Model agrees well with most experimental data, there are critical unanswered questions which can only be explored at higher energy. The 20 TeV proton beam energy would allow an exploration of this new physics domain. The new facility would have immense physics potential for truly major advances in understanding the fundamental nature of matter. It would operate in an energy domain where there are no existing or planned facilities anywhere in the world, and it would assure a world competitive U.S. high energy physics program from the mid-1990's into the next century. Such a project has been made technically possible by the outstanding successes of the substantial U.S. High Energy Physics R&D efforts in superconducting magnet technology, demonstrated most specifically by the successful operation of the Tevatron superconducting magnet synchrotron at Fermilab.

Accelerator R&D related to the next generation proton collider, called the Superconducting Super Collider (SSC), was initiated in 1984, largely as a redirection of efforts from earlier planned accelerator R&D. The 1984 work included R&D on technical options (particularly with regard to superconducting magnets), cost reduction studies, and a Reference Designs Study (RDS) which established technical feasibility and developed credible preliminary cost and schedule estimates. Research and development activities in FY 1985 included R&D to confirm RDS assumptions; cost reduction studies; further R&D on superconducting magnet designs to provide the technical basis for selection of the magnet type which would yield the best performance at the lowest facility cost; studies to refine the definition of the scope of the facility and to develop a cost performance optimized design; and development of a technical site criteria report. In FY 1986, SSC related research and development includes advanced accelerator R&D to develop a cost/performance optimized design for the selected type of superconducting magnet, to develop cost effective techniques for fabrication of full length superconducting magnets, and to develop conceptual systems designs. This program will provide the technical information for an in-depth Departmental review of plans and designs for an SSC this summer. The direction and emphasis of the accelerator R&D program, especially the work on superconducting accelerator magnets and associated systems, in FY 1987 will depend on the results of this review.

In addition to research carried out using high energy accelerators in the U.S., the Department's high energy physics program supports experiments which use the capabilities of unique foreign accelerators and also some experiments which do not require beams from particle accelerators. The research carried out at facilities overseas takes advantage of unique research opportunities offered by foreign accelerator facilities which have capabilities not available in the U.S. There is a long history of successful and mutually beneficial international cooperation in high energy physics which includes participation by scientists from one region doing experiments on accelerators in another region. Access is on the basis of the scientific merit of proposals and without charge for use of the facilties. The research using particles from non-accelerator sources includes studies of very rare processes such as the theoretically predicted decay of the proton, and searches for neutrino mass and isolated magnetic monopoles. The proton decay experiments employ large detector systems located in deep underground laboratories to provide an environment with a very low level of background radiation.

The FY 1987 request for operating expenses is $427,500,000. The major feature of the program in FY 1987 will be the first operation for research of the proton-antiproton colliding beam capability provided by Tevatron I, and of the 50 GeV on 50 GeV electron-positron colliding beam capability provided by the SLC. The program will also include operation and research utilization of the recently upgraded fixed target facilities at Fermilab, of the BNL AGS with its fixed target program including rare kaon decay experiments and its unique high energy polarized proton beam, and of the SLAC PEP and SPEAR colliding beam facilities. There are major incremental costs associated with operation of the new world forefront Tevatron and SLC collider facilities. These two new research capabilities ensure a world leading position for the U.S. program. The request brings these new research facilities into operation and accommodates an overall facility utilization level near 50 percent. The request provides continuing support for university based groups including user group efforts at U.S. and foreign accelerators, non-accelerator experiments, and theoretical research efforts. The FY 1987 program also includes funding for a continuation of advanced technology accelerator and detector R&D.

The FY 1987 capital equipment request of $77,500,000 meets the high priority needs for the detectors required to implement strong research programs based upon the new capabilities provided by the Tevatron proton-antiproton collider at Fermilab and by the SLC electron-positron collider at SLAC. The equipment request for FY 1987 is essential to make it possible for these new detectors to be completed in FY 1989 and thereby permit most effective utilization of the new U.S. High Energy Physics facilities being completed in FY 1986 at Fermilab and SLAC.

The FY 1987 request for construction funds is $41,700,000. This program includes continued work on upgrading of the central computing capability at Fermilab ($14,157,000) which is required for the analysis of the large volume of new physics data coming from the Tevatron program, to continue construction of the AGS Accumulator/Booster at BNL ($3,500,000) and to complete construction of the SLC ($976,000) and Tevatron I ($367,000). Funds are also requested for Accelerator Improvement Projects (AIP) ($11,500,000), and for General Plant Projects (GPP) ($11,200,000).

The AIP projects are essential on an annual level of effort basis for maintaining the reliability and efficiency, as well as the scientific effectiveness, of the existing accelerator facilities. Needs for AIP funding will increase in FY 1987 with the major new facilities coming into operation at Fermilab and SLAC. GPP projects are required to keep the general plant of the laboratories, including buildings, utilities and roads, in viable operating condition. The High Energy Physics program has the responsibility to provide for the full GPP needs of the multi-program Brookhaven National Laboratory as well as those of the single-purpose laboratories, Fermilab and SLAC.

The High Energy Physics program is described in terms of three subprograms: Physics Research, Facility Operations and High Energy Technology. Although these three functions within the program are discussed as separate sub-programs, they are not independent. Each is coupled to the other two and cannot exist separately. The close interaction and dynamic nature of these three subprograms may require that some adjustments among them be permitted during the year in order to ensure the most effective program and the best use of overall program funds.

The High Energy Physics program supports numerous university research contracts in which there is substantial cost sharing by the universities. The universities provide their contributions in a number of ways, such as partial salaries to investigators, provision of laboratory space and machine and electronic shop facilities, computing time and/or equipment, and direct funding contributions for services and equipment. The High Energy Physics program encourages such cost sharing policies to achieve maximum utilization of available Federal funds. In addition, there is cost sharing in a number of experiments by foreign participants, including substantial contributions to major detectors such as the Japanese and Italian support of the Collider Detector Facility (CDF) at Fermilab.

Physics Research	FY 1985	FY 1986	FY 1987 Request
Operating Expenses..........................	$106,300	$106,268	$118,600

The Physics Research subprogram includes the support of university- and laboratory-based research groups for the planning, preparation and execution of experiments, and for the measurement, analysis, interpretation, and dissemination of experimental results. It also supports the research of university- and laboratory-based theoretical physicists engaged in both phenomenological and formal areas of theoretical study.

Experiments in high energy physics generally require the use of large particle accelerators, together with complex detection apparatus, to study the results of the collisions of high energy particles. The DOE-supported accelerators and experimental facilities are located at three central laboratories, where they are made available to qualified scientists on the basis of the scientific merit and promise of their research projects. About 75 percent of the research done with these central facilities is performed by university-based physicists. Because of the size and complexity of a typical high energy physics experiment, users from a number of institutions frequently collaborate on a given experiment. These research teams typically include a mix of physicists, engineers, technicians, and graduate students. After a research proposal to the laboratory is accepted, the research teams participate in the design and fabrication of detectors and provide manpower for the experiment during the data-taking phase at the laboratory. There is usually significant interaction and assistance from laboratory staff, and use of laboratory support facilities, for each experiment. The entire process, from conception of the experiment to publication of results, typically takes up to five years if no major new detector is involved; if major detector design and fabrication is involved, the duration can be several years longer. U.S. user group participation in experiments utilizing unique capabilities and opportunities at foreign laboratories such as DESY (West Germany), CERN (Western Europe), and KEK (Japan) is also supported. Studies of some of the important fundamental problems in high energy physics are being carried out in experiments which do not involve the use of high energy accelerators. While experiments to search for proton decay currently represent the largest of the non-accelerator experimental efforts, there are other experiments, both proposed and in operation, including searches for free quarks, magnetic monopoles, neutrino mass, and neutrino-less double beta decay.

Theoretical research provides a framework for understanding the results of experimentation and provides suggestions for new measurements important for advancement of understanding. Experiments test existing theory, and provide the basis for extensions, revisions and modification of the theoretical framework and understanding. Because of this strong interplay between, and interdependence of, experimental and theoretical research, experimental and theoretical research groups often work closely together. High energy theoretical research presently has a strong focus on the development of a unified description of the forces in nature through generalized quantum field theories. An increasingly successful trend in theoretical research is the use and development of large-scale computing facilities to explore numerical solutions of candidate theories which are not amenable to analytic methods, along with the development of more powerful numerical and analytical techniques.

The Physics Research Subprogram also includes an Outstanding Junior Investigator program which provides research support for outstanding untenured high energy physicists who might otherwise have to leave the field due to lack of availability of permanent academic positions. This small program is very important for encouraging some of the best young scientists to remain in this field of research, and thus bears importantly on the long range vitality of the field.

The FY 1987 budget request of $118,600,000 for Physics Research is necessary to maintain the capability of the university and laboratory research groups to participate effectively in today's more complex experiments, particularly those using the new capabilities at Fermilab and SLAC; to provide a level of effort reasonably matched with the planned level of facility utilization; and to maintain the important theoretical research and non-accelerator high energy physics research programs.

Distribution by Facility

	FY 1985	FY 1986	FY 1987 Request
Fermi National Accelerator Laboratory (Fermilab)	$ 9,603	$ 9,382	$ 10,300
Brookhaven National Laboratory (BNL).............	7,100	6,989	7,600
Stanford Linear Accelerator Center (SLAC)........	11,106	10,818	11,900
Argonne National Laboratory (ANL)................	4,920	4,787	5,300
Lawrence Berkeley Laboratory (LBL)...............	8,400	8,454	9,200
Universities and Other Agency Laboratories.......	65,171	65,838	74,300
Total Physics Research..........................	$106,300	$106,268	$118,600

Fermi National Accelerator Laboratory

In FY 1987 $10,300,000 is requested for the support of the Fermilab in-house research effort. This level will permit continued physics research activity by Fermilab scientists, most of which is done in collaboration with university-based groups from across the country. In this mode, the Fermilab staff participate in forefront research while simultaneously providing a crucial support and liaison function for the many university users of the Fermilab facilities. A major focus of their research efforts will be the unique new opportunities for fixed target research becoming available with completion of the full set of beams and targets provided by Tevatron II construction, and for colliding beam research becoming available with the new Tevatron collider facilities.

The major lines of research to be pursued by Fermilab scientists in FY 1987 will be searches for new particles, studies of nucleon structure and constituents, and exploration of the electroweak force through neutrino interactions. The 900 GeV capability of the superconducting synchrotron, in conjunction with the upgraded and new fixed target experimental facilities, as well as the new proton-antiproton colliding beam capability, will offer many highly promising new and unique opportunities for research advances. Major experiments will study: W and Z production and searches for new phenomena in colliding beam experiments; the properties of jets of particles produced with high transverse momentum; the dimuon spectrum resulting from energetic proton collisions with a fixed target; the direct production of single photons in hadronic collisions; the characteristics of interactions of neutrinos at the higher energies now available; the substructure of nucleons using the superconducting "Chicago Cyclotron" magnetic spectrometer; and the creation of charmed and heavier quark states by photons and hadrons in experiments at new higher energies. The requested funds also include support for the Fermilab theoretical physics research program, including a small effort which explores the interface region between astrophysics and high energy physics.

Brookhaven National Laboratory

In FY 1987 $7,600,000 is required for the BNL research groups. The research capabilities at the AGS are unique, since no other accelerator covers this intermediate range of beam energies or provides similar beams of high energy polarized protons. Major research thrusts during FY 1987 will be the study of the interactions of polarized beams on both unpolarized and polarized targets utilizing the high energy polarized beam capability at the AGS, a search for neutrino oscillations, and a program of innovative studies of rare K decays. Most of this work will be performed at the AGS in collaboration with university based groups. A complementary program of theoretical analyses of experimental results and more formal theoretical studies will also be pursued.

Stanford Linear Accelerator Center

In FY 1987 $11,900,000 is requested for support of SLAC physics research groups. The first experiments at the new SLC facility will begin with the upgraded Mark II detector. The SLC experimental program will initially concentrate on studies of the Z^0 and its decay modes. PEP is expected to operate at a new record high luminosity in FY 1987 and provide excellent opportunities for new discoveries with the upgraded TPC detector. Higher precision experiments including precision measurements of electroweak asymmetries and particle lifetimes will be emphasized. Analysis of data from the SPEAR detector (Mark III) will continue concentrating on states in the Psi region to obtain a more detailed understanding of charmed quark matter. The theoretical program at SLAC includes phenomenological studies, as well as studies of fundamental issues concerning properties of the basic forces, the constituents of matter and the unification of forces.

Argonne National Laboratory

In FY 1987 $5,300,000 is requested for the ANL physics research program. ANL scientists will be participating in the analysis phase of experiments done with the HRS detector at PEP. They are also playing a major role in the study of proton-antiproton collisions with the CDF detector at Fermilab and preparation for use of the polarized proton beam at Fermilab. They also are major participants in the Soudan II nucleon decay experiment. The ANL physicists collaborate closely in these

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer. (1)	General Reduction (2)	Management Initiatives (3)	Pay Cost Restoration (4)	FTE General Reduction (5)	Gramm-Rudman-Hollings (6)	ES&H Transfer/ Reprogramming (7)	Subtotal (8)	Comparability Adjustments (9)	Total (10)
High Energy Physics (ER)										
Physics Research										
Operating Expenses	$111,300	$ -300				$ -4,732		$106,268		$106,268
Subtotal	111,300	-300				-4,732		106,268		106,268
Facility Operations										
Operating Expenses	187,800	-4,700				-7,806	-200	175,095		175,095
Capital Equipment	73,100	—				-3,116	—	69,984		69,984
Construction	55,500	2,000				-2,451	—	55,049		55,049
Subtotal	316,400	-2,700				-13,372	-200	300,128		300,128
High Energy Technology										
Operating Expenses	92,400	—				-3,938	—	88,462		88,462
Subtotal	92,400	—				-3,938	—	88,462		88,462
Subtotal, High Energy Physics.	520,100	-3,000				-22,042	-200	494,858		494,858
General Reduction:										
Operating Expenses	-5,000	5,000								
Capital Equipment	—	—								
Construction	2,000	-2,000								
Total, General Reductions	-3,000	3,000								
Management Initiatives:										
Operating Expenses										
Capital Equipment										
Construction										
Total, Management Initiatives										
Pay Restoration										
Use of Prior Year Balances (HEP)										
Operating Expenses										
Capital Equipment										
Construction										
Total, Prior Year Bal. (HEP)										

activities with university research groups and, together with the unique ANL laboratory capabilities, provide an important technical service base for these groups. The high energy theoretical physics group at ANL focuses on the study and formulation of phenomenological models for strong interactions.

Lawrence Berkeley laboratory

The request provides $9,200,000 in FY 1987 for the LBL research programs to maintain an approximately constant overall level of activity. These funds are required for participation of the LBL research groups in experiments at SLAC, Fermilab and other laboratories. LBL scientists will play a major role in the first experiments at SLC, using the upgraded Mark II magnetic detector. LBL plays a lead role in the experimental program at PEP using the Time Projection Chamber (TPC). Groups of physicists from LBL are also playing important roles in both major detector facilities at the Tevatron collider. An important part of the LBL program is the Particle Data Center, which is the only such capability in the U.S. and which provides a valuable service function for the U.S. and worldwide high energy physics communities. Modest support for high energy astrophysics experiments in 3 degree Kelvin background radiation, supernova detection and observation, and studies of compact stellar objects are expected to continue. These experiments provide important data on elementary processes and complement other high energy physics experiments. Theoretical physics at LBL will continue to emphasize the investigation of elementary particle interactions, the fundamental structure of matter, and topics in advanced accelerator physics.

Universities and other Agency Laboratories

The Physics Research request for FY 1987 provides $74,300,000 for the support of the university-based experimental and theoretical research groups and for high energy physics research programs at the Ames Laboratory, Los Alamos National Laboratory (LANL), Oak Ridge National Laboratory (ORNL), and Pacific Northwest Laboratories (PNL). This amount is required to permit these research groups to participate effectively as users at U.S. accelerator laboratories and unique foreign facilities to perform complex forefront fixed target and colliding beam experiments; to perform new forefront non-accelerator experiments; to conceive and test innovative ideas for the next generation of experiments; and to carry out theoretical and phenomenological analyses.

The Department supports approximately 115 experimental and 65 theoretical high energy physics research groups at 90 universities across the nation, as well as the research efforts at Ames, LANL, ORNL and PNL. DOE university-based high energy experimental groups are engaged in many forefront experiments in various stages of progress, collecting data from the U.S. accelerators at BNL, Cornell, Fermilab, and SLAC, and also from European accelerators at the European Laboratory for Particle Physics (CERN) and the Deutsches Elektronen-Synchrotron (DESY), from the Japanese TRISTAN facility at KEK, and from non-accelerator settings (e.g., deep mines for proton decay). Such well-conceived and carefully executed experiments provide the basis for progress in the field. The theoretical program includes a variety of activities ranging from abstract theoretical considerations to phenomenological studies. This work includes development of powerful methods for calculating lattice gauge formulations of quantum chromodynamics, and for predicting the results of electroweak interactions and model unification theories.

	FY 1985	FY 1986	FY 1987 Request
Facility Operations			
Operating Expenses............................	$172,715	$175,095	$213,400
Capital Equipment.............................	58,700	69,984	77,500
Construction..................................	114,000	55,049	41,700
Total Facility Operations..................	$345,415	$300,128	$332,600

Facility Operations supports the many activities required to operate, maintain, equip, and construct the high energy accelerators, colliding beam facilities, experimental areas, secondary beams, large multi-user detector facilities, and central computing facilities which are essential to the pursuit of experimental high energy physics research.

	FY 1985	FY 1986	FY 1987 Request
Operating Expenses	$172,715	$175,095	$213,400

The operating expenses portion of Facility Operations provides funding for the accelerator and experimental facility operating crews and support personnel, the electric power, and the expendable materials and supplies required for these activities which are concentrated at the three DOE high energy accelerator centers located at BNL, Fermilab and SLAC. These accelerator facilities provide the beam time for the research work of most of the high energy physics experimental research groups in the U.S., including many who receive their direct research support from the National Science Foundation (NSF). The accelerator and colliding beam facilities required for research in high energy physics are large, complex, and expensive. Hence, they are few in number and are operated at central locations as national facilities which are made available to those physicists whose research proposals are judged to have the highest scientific promise and merit.

The complementary capabilities at the three accelerator centers provide the essential variety in types of particle beams, particle energies and beam intensities for a productive U.S. high energy physics program. At Fermilab, the superconducting magnet Tevatron provides intense beams of protons with energies up to 800 GeV and various types of secondary particle beams with the high energies and high intensities needed for forefront fixed target experiments. In FY 1987, the 900 GeV on 900 GeV proton-antiproton colliding beam facility provided by Tevatron I will be in operation for research for the first time. At BNL, the AGS provides protons with energies up to 30 GeV in the primary beam, high energy polarized proton beams, secondary particle beams, and neutrino beams, for use in fixed target experiments. At SLAC, the two-mile linear accelerator provides both electrons and positrons at energies up to 50 GeV, for High Energy Physics research at the new Stanford Linear Collider (SLC) (50 GeV on 50 GeV), the PEP storage ring facility (15 GeV on 15 GeV) and the SPEAR storage ring facility (4 GeV on 4 GeV).

In FY 1987 there are major incremental costs required to initiate operation for research of the new Tevatron proton-antiproton colliding beam facility at Fermilab and of the unique new SLC electron-positron collider capability at SLAC. The funding request in FY 1987 will provide for these new needs while permitting an average overall utilization level for HEP facilities near the 50 percent level. Good utilization of these new research capabilities is essential to a world competitive position for the U.S. program. In order to support the first research utilization of these two new world forefront capabilities at Fermilab and SLAC, operation of the AGS at BNL, of the PEP and SPEAR facilities at SLAC, and of the fixed target facilities at Fermilab, will be reduced.

Operating Expenses
Distribution by Facility

	FY 1985	FY 1986	FY 1987 Request
Fermilab	$ 83,268	$ 84,536	$100,700
BNL	35,865	35,710	38,400
SLAC	50,835	49,783	68,600
LBL	700	718	800
Other	2,047	4,348	4,900
Total Facility Operations	$172,715	$175,095	$213,400

Fermi National Accelerator Laboratory

The FY 1987 request for Facility Operations at Fermilab is $100,700,000. There are major incremental costs at Fermilab associated with first operation for research of the world forefront Tevatron collider facility. Initiation of the colliding beam experiments requires operation of the new antiproton source; this is a major facility in its own right, including a complex target facility and two new storage ring accelerators. The superconducting magnet accelerator will be operated about six months for research in FY 1987. Operation of the entire expanded sequence of accelerators at Fermilab (Cockroft-Walton preaccelerator, linac, booster, main ring, superconducting Tevatron ring and antiproton source storage rings) will require $60,700,000. The FY 1987 program is expected to include three months of operation in the fixed target research mode at energies of about 800 GeV energy, and three months for colliding beam research. In addition about one month will be required for change-over and start up activities. Operation of the laboratory's extensive set of secondary beams, fixed target detectors, colliding beam detectors and central computing facilities will require $40,000,000. During operations for the fixed target program, about ten secondary beam lines will provide a variety of intense high energy particle beams for research use, and about 14 different experiments are expected to take data. The Fermilab fixed target research program in FY 1987 will exploit the availability of secondary particle beams of higher energies and, in most cases, higher intensities than are available anywhere else in the world. It is a world unique and truly forefront program which has high priority within the national high energy physics program. The colliding beams research program will provide the first data for the new Collider Detector at Fermilab (CDF), and simultaneously for three other small colliding beams experiments. This will provide the first exploration of subnuclear phenomena near 2000 GeV collision energies.

Brookhaven National Laboratory

In FY 1987 $38,400,000 is requested for operation of the AGS and associated experimental facilities. This will result in a somewhat reduced level of operation relative to FY 1985 and FY 1986. Of this amount, $19,500,000 is needed for accelerator operations and $18,900,000 is needed for experimental facility operations. This will support about a six month level of machine operations. The FY 1987 operating program is expected to to be divided among slow extracted beam operation, polarized proton beam operation, and fast extracted beam operation for neutrino experiments. During the slow beam operations, approximately eight experiments will be taking data simultaneously, emphasizing the high priority rare kaon decay experiments. Also included are lease costs for the CAD/CAM computer system. In addition, the AGS will also be operated for heavy ion research which is funded by the Nuclear Physics program.

Stanford Linear Accelerator Center

$68,600,000 is requested in FY 1987 for Facility Operations at SLAC. Of the request, $40,700,000 is for the operation of the linear accelerator, SLC, PEP, and SPEAR, and $27,900,000 is for the operation of the experimental areas, detector facilities and the central computer facility (including lease costs for the IBM 3081-K and upgrades). There are major incremental costs at SLAC in FY 1987 to bring the world forefront SLC collider into first operation. The linac presently operates mostly at 60 pulses per second for injection into the PEP and SPEAR colliders; however, research operation of the SLC requires operation of the linac at 120 pulses/second. This increased pulse rate results in a large increase in power usage and in the rate of klystron and thyratron replacements. These effects, combined with the rapidly rising electric power rates from WAPA (nearly 50 percent from FY 1985 to FY 1987) and the need to purchase some power from PG&E during 120 pulses/second operation, result in the large incremental cost for SLC operation. The current plan is to operate the linear accelerator for High Energy Physics for about six months. During the 2-1/2 months for SLC commissioning the linac would operate mostly at 60 pulses/second, while during the 3-1/2 months of physics research with SLC it would operate mostly at 120 pulses/second. Research utilization of the SLC will require operation of the upgraded Mark II detector and the associated collider experimental hall. Operation of PEP is expected to continue at higher luminosity with an improved TPC detector. To permit funding for the commissioning and first operation of SLC, operations of the SPEAR and PEP storage rings will be significantly reduced in FY 1987. SPEAR will remain available for use by the Stanford Synchrotron Radiation Laboratory which is supported by the Basic Energy Sciences Program.

Lawrence Berkeley Laboratory

The request provides $800,000 for support of LBL's participation in the operation of the Time Projection Chamber (TPC) detector facility at PEP. LBL provides engineers, computer scientists, technicians, and physicists who are responsible for reliable operation of the TPC.

Other

In FY 1987, $4,900,000 is requested for special process spares and common use stores inventories and other specialized activities to meet requirements for effective operation of the accelerator laboratories. An adequate complement of spares and specialized replacement parts is essential to avoid unnecessary disruptions to the operating schedule in the event of component failures. These very complex and advanced technology facilities require many components that are not off-the-shelf items but must be custom made in advance if they are to be readily available when a replacement part is needed. In FY 1987 there are increased needs to provide adequate spares support for the new facilities at Fermilab and SLAC.

	FY 1985	FY 1986	FY 1987 Request
Capital Equipment............................	$ 58,700	$ 69,984	$ 77,500

Capital Equipment funding is required to provide the secondary beam line components, particle detection apparatus, portable shielding, and data analysis systems essential to do high quality, forefront high energy physics experiments. It is also required for replacement of accelerator and detector facility components that have worn out or become obsolete. A proper complement of detectors and secondary beams is essential for effective utilization and operation of the major high energy physics accelerator and colliding beam facilities. The world forefront detectors required for more effective utilization of the new and unique research capabilities of both the Tevatron and the SLC colliders have total costs in the vicinity of $50 million and require about five years to fabricate.

Timely introduction of new beam and detector capabilities, and the regular upgrading and modification of existing capabilities, is essential. The large scale of the equipment required for high energy physics research systems is illustrated by a few examples: a typical secondary beam line can range from several hundred feet to a mile or more in length, and requires many beam transport, beam shaping and control elements; the portable shielding required around detectors and targets can involve arrays of hundreds of shielding blocks weighing as much as 10 tons each; the analysis magnets incorporated in detection systems weigh many tons; large calorimeters of 100 tons or more are not uncommon; and electronics systems with hundreds of thousands of data channels are typically required for major detectors. A time span of as much as five years is often involved from design, through fabrication, to installation, checkout, and operation of these large systems. Examples of specific items of equipment needed include: beam transport magnets and large analysis magnets for detector systems; precision regulated power supplies; particle beam diagnostic and control systems; electronic and optical detectors with precision spatial and time resolution; high precision calorimeters and tracking chambers for colliding beam detectors; high speed and large volume data processing systems; special cryogenic components for liquid hydrogen targets and superconducting devices; and a host of specialized electronics and other items of laboratory support equipment.

In FY 1987, $77,500,000 is requested to meet the most urgent capital equipment needs of the program, with particular emphasis on the major world forefront detectors required for adequate utilization of the new colliding beam research capabilities coming into operation at Fermilab and SLAC. The needs for the D-Zero detector for the second experimental area at the Tevatron collider, and for the first fully scoped detector for the SLC (the SLD), are given special emphasis to make it possible for these new detectors to be completed in FY 1989. At Fermilab it will be necessary to upgrade the first colliding beam detector (CDF) and to upgrade the secondary beams and detectors required for experiments using the fixed target capabilities. At SLAC it will be necessary to upgrade the TPC detector for second generation experiments. At BNL, there are major capital equipment needs related to the large rare kaon decay detectors. There are also needs for university users, for non-accelerator experiments, and for U.S. participation in international collaborative experiments at unique foreign facilities.

High Energy Physics
Summary of Capital Equipment by Laboratory

	FY 1985	FY 1986	FY 1987 Request
Fermilab	$ 27,540	$ 31,115	$ 30,500
BNL	4,497	4,978	5,200
SLAC	9,070	14,552	21,000
LBL	1,730	1,436	1,600
ANL	1,280	747	700
Other DOE laboratories and universities	10,683	13,422	14,300
General Purpose Equipment (BNL)	3,900	3,734	4,200
Total Capital Equipment	$ 58,700	$ 69,984	$ 77,500

Fermi National Accelerator Laboratory

In FY 1987, $30,500,000 is requested for capital equipment for the Fermilab program. Needs for FY 1987 progress on the D-Zero colliding beam detector which is planned for completion in FY 1989 account for $12,500,000 of the request. Another major need ($8,500,000) is for the secondary beam lines and detectors which are essential for good utilization of the Fermilab fixed target research capabilities. The request also includes $3,500,000 for upgrades to the CDF colliding beam detector.

Summary of Capital Equipment Request for Fermilab

	FY 1987 Request
Detectors for Effective Utilization of Tevatron I	$ 16,000
D-Zero detector	12,500
CDF detector upgrade	3,500
Detectors and Secondary Beams for Fixed Target Program	$ 8,500
Detectors for fixed target experiments	4,700
Secondary beam line components and shielding	3,800
Base Program Needs	$ 6,000
Accelerator related equipment items	1,800
Support equipment for experimental program	1,600
General computing equipment	1,700
Technical support and site operations equipment	900
Total	$ 30,500

Several new and upgraded detectors need to be completed and brought into operation during FY 1987 for the fixed target program. The requested $4,700,000 for fixed target detectors includes $1,200,000 for approved experiments in the Neutrino Area, $2,100,000 for experiments in the Proton Area, and $1,400,000 for experiments in the Meson Area.

Several secondary beam line facilities need to be upgraded with new technical components in FY 1987. The major requirements for secondary beam transport lines include magnets, control systems and instrumentation, cryogenics for the superconducting magnets and shielding. A total of $3,800,000 is requested for such secondary beam equipment, of which the major efforts on new beams will include completion of the hyperon beam ($700,000), the polarized proton beam ($600,000) and the new higher energy pion beams in the Meson Area ($1,300,000) and the Proton Area ($500,000). The remainder of the requested funds will be used for upgrades to about five existing beams.

Two major colliding beam detectors (one for each major interaction hall) are being fabricated at Fermilab to conduct research at the unprecedented reaction energies scheduled to become available for the first time late in 1986, when the Tevatron collider becomes operational. The Collider Detector at Fermilab (CDF) being assembled at the B-Zero interaction region of the Tevatron will be ready for research operation near the end of FY 1986. It will provide the first studies of new physics at reaction energies in the 2000 GeV range. The $3,500,000 requested for CDF in FY 1987 will provide upgrades whose need is indicated by early pre-operating experience. Fabrication of the second colliding beam detector, to be installed at the D-Zero interaction region of the Tevatron, was initiated in FY 1985. The $12,500,000 requested in FY 1987 for the D-Zero colliding beam detector will permit major progress on this detector and will maintain a schedule that makes it possible for the D-Zero detector to be completed in FY 1989.

The numerous and technologically advanced accelerator and cryogenic systems at Fermilab require replacement items of capital equipment in order to maintain good operating condition and for the replacement of worn out and obsolete units. Items needed include components of the power, vacuum, RF, controls and cryogenic systems. Equipment needed for the R&D programs is included in this category. A network of small emulators and microprocessors, to provide more efficient access by users to the Fermilab central computing complex, is also required in FY 1987. The request also provides for the standardized electronics modules and other items of support equipment provided from a centralized pool for experimental users, as well as for technical support and site operations equipment such as machine tool replacements.

Brookhaven National Laboratory

The FY 1987 request of $5,200,000 for BNL includes $4,700,000 for needs of the ongoing AGS physics program. This includes $3,000,000 for detection equipment for the BNL physics research groups, a major part of which is for the rare kaon decay experiments; $1,100,000 for components for secondary beam line modifications; $300,000 for controls and instrumentation in various parts of the AGS complex; and $300,000 for the instrumentation pool which provides modules of standardized electronic apparatus which are available to all AGS users on the basis of need. The remaining $500,000 is for equipment needed to support the advanced accelerator R&D programs.

Stanford Linear Accelerator Center

The request of $21,000,000 in FY 1987 is required to meet equipment needs related to the SLAC linear accelerator, the SPEAR and PEP storage rings, the associated experimental detection facilities, work on a fully scoped detector (SLD) for use at SLC, and the SLAC advanced accelerator R&D programs.

The request includes $14,500,000 for progress on the first full-scope SLC detector, the SLD, designed specifically for experiments at 50 GeV on 50 GeV. This detector will include high resolution calorimetry and excellent particle identification over a large solid angle, as well as the ability to identify short-lived particles by the measurement of their path length prior to decay. The FY 1987 request is needed to maintain a schedule that makes it possible for this state-of-the-art detector to be completed in FY 1989.

The $6,500,000 requested for other activities includes completion of the modification of the PEP lattice for increased luminosity and upgrading of the TPC detector. Also included are minor upgrades of the Mark II detector at SLC. Other needs to be met from this request include equipment needs in support of SLAC's advanced accelerator research and development effort, including work on advanced concepts with potential application to future linear colliders; improvements to the central computing system and its associated network, and general laboratory support equipment.

Lawrence Berkeley Laboratory

A total of $1,600,000 is requested for capital equipment needs at LBL in FY 1987. The physics research program requires $900,000 for the support of experiments at SLAC, Fermilab, and for a double beta-decay experiment. The advanced accelerator R&D effort requires $500,000 for equipment related to LBL's efforts on antiproton cooling, on very high field superconducting accelerator magnets, and on special purpose computing devices used in performing orbit tracking calculations for advanced accelerator design. There is also a need for $200,000 for equipment in support of the advanced detector development program.

Argonne National Laboratory

A total of $700,000 is requested for ANL capital equipment needs in FY 1987. This equipment will support ANL's participation in a variety of experiments, including the new polarized proton beam experiments at Fermilab and the Soudan II proton decay experiment.

Other DOE Laboratories and Universities

A total of $14,300,000 is requested to meet the capital equipment needs of other DOE laboratories and universities. The $13,000,000 requested for university programs in FY 1987 is required for experimental detection and data analysis equipment. These funds support the major apparatus needs of the experimental research programs of the university users for experiments at U.S. and foreign accelerator laboratories, and for non-accelerator experiments such as searches for nucleon decay, neutrino oscillations, double beta decay, magnetic monopoles, and studies of very high energy processes produced by cosmic radiation.

Included in the $13,000,000 are major equipment needs ($6,500,000) for user groups participating in electron-positron colliding beam experiments presently in the preparation stage at the LEP facility at CERN, in electron-proton colliding beam experiments at the German HERA facility, and at the TRISTAN colliding beam experimental program at KEK in Japan. There are needs ($2,500,000) for non-accelerator experiments such as the proton decay searches which are operated in deep mines. There are direct funding needs of the university programs ($1,200,000) for apparatus for experiments utilizing fixed target and colliding beam capabilities at Fermilab; for experiments at the SLC and PEP Colliders at SLAC; for utilization of the high intensity capability of the AGS at BNL for neutrino oscillation, rare kaon decay and polarized beam experiments. On-line computer equipment, interfacing components and peripherals, which are an integral part of experimental detector systems, and small computer systems used in scanning, measuring, and data analysis, are also required by the university experimental groups. In addition, theoretical groups based at universities have a requirement for special computing capability for some types of theoretical research such as lattice gauge calculations. These needs require $800,000. Also included is $2,000,000 for a mainframe for data reduction for the LEP 3 experiment.

The FY 1987 request also includes $750,000 for equipment needed in support of the advanced accelerator R&D efforts and $550,000 for Ames Laboratory for detector components to be used in experiments at the LEP facility at CERN.

General Purpose Equipment (BNL)

The High Energy Physics program provides funding for all general purpose equipment requirements at BNL. In FY 1987, $4,200,000 is requested for this multipurpose equipment, which is essential to the proper day-to-day operations at the Laboratory. Included are all the needs of the Laboratory's service and support divisions, central scientific computing facility and central shops, as well as equipment required to respond to health, safety, security, and environmental needs. It is important that obsolete and worn-out equipment be replaced in order to promote efficient, safe laboratory operations, to increase productivity, and to avoid high maintenance costs.

	FY 1985	FY 1986	FY 1987 Request
Construction.................................	$114,000	$ 55,049	$ 41,700

A total of $41,700,000 in construction funding for high energy physics projects is requested in FY 1987. The projects are:

Project Title	Project No.	FY 1987 Request	Total Estimated Cost
Tevatron I (Fermilab)........................	81-E-218	$ 367	$ 84,000
SLC (SLAC)..................................	84-ER-133	976	115,400
Central Computing Upgrade (Fermilab).........	86-R-104	14,157	24,100
AGS Accumulator/Booster (BNL)................	86-R-105	3,500	26,400
Accelerator Improvement Projects (AIP).......	87-R-101	11,500	11,500
General Plant Projects (GPP).................	87-R-102	11,200	11,200
		$ 41,700	

The construction request includes funding to continue the upgrade of the central computing capability at Fermilab and the AGS Accumulator/Booster at BNL, for completion of Tevatron I and SLC, and for accelerator improvements and modifications and general plant projects which are needed on an annual basis to maintain the efficiency, reliability and scientific effectiveness of the laboratories.

Tevatron I

The Tevatron I project at Fermilab will provide the facilities needed for a 1000 GeV on 1000 GeV proton-antiproton colliding beam capability. This will be accomplished by producing intense counter-rotating beams of protons and antiprotons in the Energy Saver superconducting magnet ring and bringing them into collision to produce about 2000 GeV of reaction energy, the highest available in the world. Specifically, the project includes: 1) additional refrigeration and radio frequency accelerating structures so that the Energy Saver ring can operate at 1000 GeV for proton-antiproton colliding beams; 2) an antiproton source; and 3) two experimental areas suitable for detectors to study the results of very high energy proton-antiproton collisions. The $367,000 requested in FY 1987 is the final project funding. Additional details are provided in the Construction project data sheet.

Stanford Linear Collider (SLC)

The SLC project at SLAC, will provide: 1) systems for producing intense electron and positron bunches; 2) small storage ring and beam pulse compressor to increase the density of the electron and positron bunches; 3) two semicircular arcs of small aperture magnets, housed in appropriate enclosures to bring the electron and positron beams into head-on collisions; 4) special focusing systems near the beam interaction point, including the necessary housing and associated experimental hall and staging area; and 5) the instrumentation and control systems to operate these systems.

The SLC project will accelerate beams of electrons and positrons simultaneously in the linear accelerator, separate them and transport them through two semicircular arcs at the end of the linac and then bring them into head-on collision. Successful development of the SLC will provide an essential demonstration of the technical feasibility of the new linear collider concept, which is a critical step toward future cost effective extensions of electron-positron reaction energies beyond the maximum energy practical with circular colliders. In addition, when completed in 1986, the SLC will be the first electron positron colliding beam system in the world capable of achieving an energy of 100 GeV in the center-of-mass system and is expected to produce copious quantities of the recently discovered Intermediate Vector Boson (Z^0), one of the carriers of the electroweak force. The detailed study of the Z^0 is one of the major, exciting areas of physics research indicated by present theories. The project benefits in a major way from the use of the existing 2-mile linac and supporting facilities at SLAC. The $976,000 requested in FY 1987 is the final project funding. Additional details are provided in the construction project data sheet.

Fermilab Central Computing Upgrade

Significantly upgraded central computing capabilities and capacity are required at Fermilab in order to accommodate the data acquisition rates required for forefront experiments with the new research facilities becoming operational with completion of the Tevatron construction program. The primary source of this requirement is the antiproton-proton colliding beams capability of the Tevatron, and the two major associated new detector facilities. This new research program will generate unprecedented volumes of data requiring extensive analysis and computation in order to extract the important physics results. Experiments using the higher energies and produce much higher data rates than previously experienced. Effective utilization of these new research facilities requires significantly improved computing capability at Fermilab. A recent study emphasized the urgency of the central computing upgrade to meet these needs.

The total estimated cost of this project is $24,100,000. The project was initiated with $2,968,000 in FY 1986. The concrete exterior structure of the building is to be completed with those funds. The $14,157,000 requested in FY 1987 will permit major progress on this facility, including completion of the building and the acquisition of much of the additional central processing units, peripheral data storage devices, and interfaces to user terminals. The FY 1987 request is essential to permit completion of the computing upgrade on a time scale appropriate for effective research output from the Tevatron. Final funding is planned for FY 1988. Additional details on this project are provided in the construction project data sheet entitled "Central Computing Upgrade" (Project No. 86-R-104).

AGS Accumulator/Booster (BNL)

The accumulator/booster is a 1 GeV intermediate injector to the AGS which will provide a cost effective enhancement of the capabilities of the AGS for high energy physics experiments and also for heavy ion research. It will increase the space charge limit of the AGS, permitting the intensity of proton beams to be increased by a factor of 4 (to 5 x 10^{13} protons/pulse); increase the intensity for polarized protons by a factor of 20 (to about 4 x 10^{11} protons/pulse) by permitting the accumulation of many linac pulses in the booster before injection into the AGS; and will provide the ability to fully strip and accelerate heavy ions up to mass 200 for injection into the AGS.

The increased proton beam intensity will be extremely valuable for important rare kaon decay studies and for medium energy neutrino studies for which the AGS is a world leading facility. It will also permit simultaneous operation of slow extraction and fast extraction systems, thereby permitting neutrino experiments to operate simultaneously with other experiments and considerably enhancing the cost effectiveness of AGS operations. The increase in intensity for the unique polarized proton capability of the AGS is especially important for experiments at large momentum transfer where event rates fall off rapidly. The accumulator/booster will also extend the heavy ion capability of the AGS to ions of mass 200 (gold) compared to the present limit of mass 32 (sulfur).

The TEC of the project is $26,400,000. The project was initiated with $1,915,000 appropriated in FY 1986; $3,500,000 is requested in FY 1987 to continue the project. The remaining funding is scheduled for FY 1988 and FY 1989. Additional details on this project are provided in the Construction project data sheet entitled "AGS Accumulator/Booster" (Project No. 86-R-105).

Accelerator Improvement Projects

A total of $11,500,000, which maintains an approximately constant overall level of effort, is required for Accelerator Improvement Projects (AIP) to be distributed as follows: Fermilab ($5,900,000); BNL ($2,500,000); and SLAC ($3,100,000). AIP funds are required on an annual basis to provide essential modifications and upgrades of the existing accelerator and colliding beam facilities for the purpose of ensuring their scientific effectiveness and improving their operating economy and efficiency.

It is necessary to provide new or modified research capabilities on short notice in order to accommodate the special needs of new high priority experiments. These changes are often required on a time scale much shorter than the normal two to three year Federal budget cycle. As a consequence, AIP funds are essential to permit a rapid and flexible response essential to meet the most urgent of such needs and maintain a highly effective program.

There are special needs for AIP funds at Fermilab because of the very large scale and scope of the laboratory which includes a series of seven accelerators, storage rings and pre-accelerators, as well as the extended cryogenics facilities, beam extraction systems, secondary beam lines and experimental facilities, all of which make up the complex Tevatron facility. Also in FY 1987 there will be additional accelerator facilities requiring such funds at the SLAC complex following completion of the SLC. Additional details on the AIP needs at each of the three accelerator laboratories are provided in the construction project data sheet entitled "Accelerator Improvements and Modifications" (Project No. 87-R-101).

General Plant Projects

General Plant Projects (GPP) funds are for upgrading, modification, and improvement of the general laboratory plant at BNL, Fermilab and SLAC. GPP funds are required for projects such as utilities, support buildings, roads, shops, on-site fire fighting capability, etc., and, although small compared to the capitalized value of the plant, are essential to keeping it in efficient operating condition. The FY 1987 request totals $11,200,000 for an approximately constant level of GPP at the following laboratories: Fermilab ($3,300,000), BNL ($6,000,000), and SLAC ($1,900,000). It is noted that at BNL the High Energy Physics Program has the responsibility to provide funding for all of the GPP needs of this multi-program laboratory. Additional details are provided in the construction project data sheet entitled, "General Plant Projects, Various Locations" (Project No. 87-R-102).

	FY 1985	FY 1986	FY 1987 Request
High Energy Technology			
Operating Expenses	$ 90,200	$ 88,462	$ 95,500

Progress in forefront scientific research is strongly linked to advances in technology. The performance capability of the facilities and instrumentation available to researchers affects the ability to make significant advances. Development of new accelerator and detector capabilities and of new better types of instrumentation depends not only on the development and application of new advanced technologies but also frequently requires extension of the underlying scientific and engineering principles. Research in high energy physics requires some of the most complex and technologically advanced research facilities ever built. The development of applicable supporting technology not only in response to the needs of research but also in anticipation of them is an essential feature for the DOE supported program in high energy physics.

The High Energy Technology subprogram has the specific goal of providing the technological base for improving the scientific effectiveness, reliability and efficiency of existing facilities and for extending the scientific capability of the experimental research program through new concepts and new, advanced facilities. As a byproduct, work carried out under the High Energy Technology R&D subprogram frequently pushes forward or opens up new technological frontiers, thereby contributing significantly to the national technology base and to many specific needs in other areas of science, technology and medicine. In order to sustain an effective technology R&D effort that is both responsive to the needs of and stimulates the basic physics research programs, it is necessary also to pursue a vigorous theoretical research effort into the physics and engineering principles underlying the concepts and operation of these facilities; to conduct forefront R&D in selected, promising areas of applicable technology; to develop and prove emerging ideas and concepts; and to transform these ideas and concepts into practical devices and techniques for use in physics research and elsewhere.

The High Energy Technology subprogram is subdivided into two major areas: Accelerator R&D and Experimental Facility R&D. The first is concerned with the production of particle beams and the second with the utilization of those beams for physics research. Specifically, accelerator R&D is concerned with the science and technology fundamental to charged particle accelerators, colliding beam systems, beam extraction, and primary beam transport systems. Its goal is to develop new and improved concepts, techniques, and devices of direct application to the acceleration, storage, and transport of particle beams to be used for probing the innermost depths of matter and energy. The end products are particle beams of higher energy, increased intensity, longer stored lifetime, greater brightness (more particles per unit transverse beam area), lower cost and greater diversity. Experimental facility R&D is concerned with the targets, secondary beam transport systems, detection apparatus, and data processing systems directly involved in the physics experiments. It focuses on developing new and improved means for generating, splitting, and transporting secondary particle beams; on inventing and developing new types of instrumentation required for detecting and studying the characteristics of particle interactions produced in experiments; and on devising advanced processing techniques for the collection and analysis of data gathered in experiments.

While the purpose and thrust of the technology R&D subprogram is to ensure and extend the technology base vital to the progress of high energy physics research, the results of the advanced R&D effort frequently find significant application in other scientific and engineering disciplines. Thus, advances in the understanding of charged particle beam technology have contributed to the development of high power radiofrequency tubes, electron microscopes, semiconductor manufacture, and x-ray sources. Standardized instrumentation systems sponsored and developed by the high energy physics program, such as the recently completed FASTBUS, have become national and international standards used in other research disciplines, industrial process control and artificial intelligence. Pattern recognition methods developed for bubble chamber scanning in high energy physics were essential in the development of Computer Assisted Tomography (CAT) scanners. Superconducting magnet technology and pattern recognition methods have been applied to the new Nuclear Magnetic Resonance (NMR) devices which are expected to revolutionize medical diagnostics.

The High Energy Technology R&D activities are concentrated primarily at five DOE supported national laboratories, although an important part is carried out by universities, other laboratory and non-profit institutions, and industrial firms. The FY 1987 request of $95,500,000 for the High Energy Technology Subprogram includes a program of R&D studies in support of upgrades to maintain the scientific effectiveness of existing accelerator, colliding beam, detector and experimental facilities; in support of ongoing construction projects; and to develop very advanced concepts and techniques with potential application to future acceleration and detection facilities. The FY 1987 request includes continued R&D studies on superconducting magnets for accelerators and their optimization for future accelerators including materials development, cryogenics and manufacturability studies. Also included are magnet systems studies such as vacuum, instrumentation and control systems, and the effects on these systems and on the magnets themselves, of operating a series of magnets as a system. Important accelerator physics studies include non-linear beam dynamics, both analytical and by tracking, and the production and maintenance of bright, low emittance beams.

The studies on superconducting magnets and systems and their optimization are a high priority need for the future viability of the program. The U.S. breakthrough in superconducting magnet technology, represented most dramatically by the successful operation of the Tevatron, signifies that no future high energy proton or hadron accelerator can competitively be built anywhere without the use of superconducting magnet technology. Further, electron accelerators with capabilities significantly beyond those of the SLAC SLC and the CERN LEP machine will require new accelerator techniques and methods which are expected to require many years of R&D before coming to fruition. Thus, any new frontier high energy accelerator for the near future is expected to require the use of superconducting magnets and R&D and optimization of these magnets for future facilities has high priority. The results of the advanced accelerator R&D program for the next generation particle collider through FY 1986 will provide the technical information for an in-depth Departmental review of an SSC type facility. Those results can be expected to have a strong impact on the direction and emphasis of the FY 1987 R&D studies particularly in the area of superconducting magnets and systems.

	FY 1985	FY 1986	FY 1987 Request
High Energy Technology			
Fermi National Accelerator Laboratory.........	$ 27,735	$ 23,360	$ 24,900
Brookhaven National Laboratory................	19,305	18,956	20,200
Stanford Linear Accelerator Center............	16,585	15,509	16,400
Argonne National Laboratory...................	1,681	1,436	1,700
Lawrence Berkeley Laboratory..................	8,190	7,850	8,600
Other DOE laboratories and universities.......	16,704	21,351	23,700
	$ 90,200	$ 88,462	$ 95,500*

*Allocations tentative pending departmental review of SSC.

Fermi National Accelerator Laboratory

A total of $24,900,000 is requested for Fermilab in FY 1987 for technology R&D. Of the FY 1987 request, $16,200,000 is for accelerator R&D, and $8,700,000 is for experimental facilities R&D.

Operation of the superconducting magnet ring as a proton-antiproton collider in a totally new energy regime is scheduled to begin late in FY 1986. An extensive R&D program to understand and optimize the properties and performance of the antiproton source and of the Tevatron as a storage ring will be required. Properties of the Tevatron operating with simultaneously circulating beams of protons and antiprotons will be studied with the object of improving reliability, efficiency and luminosity. The operational characteristics of the antiproton source will also be studied with the aim of improving overall performance and luminosity of the collider. Prototypes of an improved lens for the antiproton target, of higher frequency stochastic cooling systems, and of higher capability instrumentation and control systems will be fabricated and tested. R&D will be carried out to investigate ways to increase the brightness of the antiproton source, and on the feasibility of a pre-booster to improve the beam intensity of the Tevatron. R&D on advanced technologies for accelerator and colliding beam systems will also be carried out. R&D on improved superconducting magnets, cryostats and systems will continue.

As Fermilab begins to exploit the research capabilities made available by completing Tevatron I and II, there will be a special focus in the experimental facilities R&D program on the development of higher performance beam transport, targeting and beam splitting apparatus and on improved particle detectors for experiments to more effectively utilize the higher energy fixed target research capabilities. R&D will be needed in support of colliding beam experiments and detectors; particularly the new D-Zero detector. Improved triggering techniques, computer software and special on-line graphics capabilities will be developed. An important component of these efforts will be R&D aimed at improvements in computer techniques and systems. More advanced software for data collection, data reduction and graphical display of results will be required. The program will also include studies to develop advanced detector concepts.

Brookhaven National Laboratory

The FY 1987 request includes $20,200,000 for technology R&D at BNL. Of this, $17,400,000 is for accelerator R&D, and $2,800,000 for experimental facilities R&D.

The accelerator R&D related to the AGS has the goal of maintaining and improving the operating effectiveness and the scientific capability of the AGS. There will be a special effort directed toward achieving a major increase in AGS accelerated beam intensity, and improvements to the polarized beam capability. Advanced R&D on new accelerator concepts and technologies will also be pursued, with particular emphasis on studies of superconducting technology capitalizing on BNL's expertise in this area.

The experimental facilities R&D will focus on new detector and beam line developments aimed primarily at improving the unique capabilities at the AGS for polarized beam experiments, low energy neutrino studies, and rare kaon decay processes. The program also includes an effort on development of advanced detector concepts.

Stanford Linear Accelerator Center

A total of $16,400,000 is requested in FY 1987 for technology R&D at SLAC. The FY 1987 request includes $8,600,000 for support of accelerator R&D and $7,800,000 for experimental facility R&D.

In FY 1987 the SLC project will be brought into operation for research; supporting R&D will concentrate on optimizing performance and reliability and improving luminosity. Special areas of study will include development of methods for enhancing positron beam intensity; problems of stability of high current micron-sized beam pulses in the linear accelerator during acceleration; beam transport to focus the beams of electrons and positrons to a tiny spot and bring them into head-on collision; methods to control and analyze the collisions of the very high intensity micron-sized electron and positron pulses; and development of techniques for acceleration of polarized electrons.

The balance of the accelerator R&D funds will be directed toward improvements in performance, reliability, and operating efficiency of the linear accelerator and the SPEAR and PEP colliding beam devices, and toward advanced concepts. Advanced concept R&D activities at SLAC will include development of high gradient accelerating structures, development of very high power pulsed radio frequency sources, theoretical and experimental studies of new and advanced concepts of linear accelerator systems, development of advanced beam instrumentation and control devices, and development of special beam transport systems for micron sized beams.

Experimental facility R&D at SLAC in FY 1987 will be directed primarily toward the development of advanced detectors for future experiments at the SLC and PEP. Particular emphasis will be placed on R&D in support of the SLD detector.

Lawrence Berkeley Laboratory

A total of $8,600,000 is requested in FY 1987 for technology R&D at LBL. Of this amount, $5,800,000 is to be used to support advanced accelerator R&D, including studies of very high field superconducting magnets, collaborative studies with Fermilab and others on stochastic cooling techniques, and work on novel accelerator concepts such as the two-beam electron accelerator concept.

The experimental facilities R&D request of $2,800,000 is to support development of a hadron calorimeter for a major proton-antiproton experiment at Fermilab; studies of advanced detectors for use with linear colliders in collaboration with SLAC; work to improve the performance of experimental apparatus at SLAC and Fermilab; and a major initiative for the development of advanced detector concepts utilizing the special expertise of LBL in this area.

Argonne National Laboratory

A total of $1,700,000 is required for ANL in FY 1987. Of that amount, $750,000 is for accelerator R&D and $950,000 is for experimental facilities R&D.

The high energy accelerator R&D at ANL for FY 1987 is expected to be directed primarily towards work on advanced accelerator concepts, particularly on the so-called wakefield devices.

Experimental facilities R&D is expected to concentrate on research and development for new types of particle detectors; further developments of the CDF; and the development of new types of polarized targets.

Other DOE Laboratories and Universities

In FY 1987, $23,700,000 is requested to support other advanced technology programs. The request provides the increase required for the SBIR assessment and an increase of about $400,000 each for advanced detector and advanced accelerator R&D. The work under this part of the technology R&D subprogram is carried out by universities, laboratories and industry. This program presently supports contracts with about 30 institutions. The work covers a very broad spectrum of topics related to accelerators, colliding beams and detectors. The work includes studies to improve upon and optimize previously available techniques and those which seek to develop entirely new techniques. As part of optimization of available techniques, effort includes work on superconducting magnets, including materials development, cryogenics, and manufacturing techniques; other magnets systems, such as vacuum, instrumentation and control systems; and accelerator physics topics such as nonlinear beam dynamics including beam-beam effects, studies both analytically and by tracking, and the production and maintenance of bright, low emittance beams.

There are also significant needs for advanced detector R&D to develop detectors that can extend the range of investigations at present facilities and operate effectively at future accelerators and colliders. R&D is needed to develop radiation hardened detector systems and electronics which can survive in the high radiation environment near the collider interaction point at high luminosity; triggering systems and data reduction systems to handle the high event rates; and techniques for pattern recognition and time tagging and tracking of complex, high multiplicity, overlapping events.

There is also a strong need to develop new accelerator techniques, which derives from the necessity of optimizing the cost of constructing and operating the large, modern accelerator and colliding beam facilities. While there are no known physics or technology reasons why present acceleration techniques cannot be extended to much higher energies than facilities now operating or planned, the size and associated cost of much higher energy facilities based on known technology could become prohibitive.

As a consequence, resources are being directed toward discovering and developing new concepts of charged particle acceleration that are more cost effective and give higher final particle energies in devices that are smaller and more energy efficient than existing ones. Representative lines of research include collective methods of particle acceleration, wake field accelerators, laser acceleration of electrons, theories of non-linear dynamics, collective effect and space charge induced phenomena, very high frequency and high power radio frequency sources, and very high field superconducting magnets. A number of these programs are reaching the point where significant experiments and prototype fabrication are required to verify predictions and guide future R&D studies. A substantial effort in this area is critical to make it possible to provide the required future high energy physics accelerator and experimental facility capabilities in a cost effective manner.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
GENERAL SCIENCE AND RESEARCH
HIGH ENERGY PHYSICS

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No.: 81-E-218

3. Date A-E work initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 4th Qtr. FY 1982

4. Date Construction ends: 4th Qtr. FY 1987

5. Previous cost estimate: $82,500
Less amount for PE&D: 0
Net cost estimate: $82,500
Date: October 1984

6. Current cost estimate: $84,000
Less amount for PE&D: 0
Net cost estimate: $84,000
Date: October 1985

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1981	$ 2,000	$ 2,000	$ 2,000	$ 1,211
1982	18,000	14,100	14,100	4,182
1983	18,000	18,000	18,000	11,845
1984	20,000	20,000	20,000	29,517
1985	21,300	21,300	21,300	19,794
1986	4,700	8,233	8,233	13,000
1987	0	367	367	4,451

8. Brief Physical Description of Project

This project provides for:

1. the modification of the superconducting Tevatron accelerator ring so that it can be used as a 1 TeV proton on 1 TeV antiproton colliding-beam storage ring;
2. two experimental areas to provide facilities for simultaneous high energy physics experiments; and
3. the construction of an antiproton production, cooling and accumulation system.

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois
2. Project No.: 81-E-218

8. Brief Physical Description of Project (continued)

Additional satellite refrigerators are required to operate the superconducting Tevatron ring near the full energy of 1 TeV because superconductors, as they approach full magnetic field, will make the transition from the superconducting to normal state with decreasing amounts of energy deposited in them. Thus, extra cooling will prevent quenches of the superconducting ring at full energy. Additional rf cavities and other special devices are required to simultaneously accelerate and store protons in one direction and antiprotons in the opposite direction, and to optimize the collision configuration.

Two experimental areas to house high energy physics colliding beam detectors will be an integral part of the Fermilab Main Ring tunnel. The design of the experimental areas will allow the rapid efficient introduction of large detectors into the beams. To accomplish this, there will be separate detector assembly areas. The project also provides an overpass for the conventional magnet ring, to deflect it over the detector at one of the experimental areas.

The Fermilab scheme for production and collection of antiprotons uses the present accelerators, up to and including the main ring conventional magnet synchrotron, plus two additional new storage rings. The first of these is the debuncher ring, operating at about 8 GeV energy, which will have a large acceptance for antiprotons and will be used to debunch the beam as it comes from the antiproton production target. The second ring is the accumulator which will be used for cooling of the antiproton beam after it emerges from the debuncher, and for accumulating the antiprotons. The term "cooling of a particle beam" means reducing the energy spread of the beam. This cooling is particularly important for producing an accelerator quality beam from the dilute beam of secondary particles emerging from the antiproton production target. The accumulator will collect the antiprotons from about ten thousand targeting cycles. It then increases their density by stochastic cooling until the antiproton beam is intense enough to transfer into the Tevatron ring, where it will be accelerated and brought into collision with a counter-rotating proton beam. The project includes construction of the debuncher ring, the enclosures for the two rings, associated beam transport enclosures and the target station.

The research detectors required for experiments will be funded as capital equipment items. The major detector for the B-Zero Area is being fabricated over the period from FY 1981 through FY 1986. Substantial participation and financial assistance is being contributed by the Japanese, and also by Italian collaborators. The total DOE funding contribution for this detector is currently planned to be about $35,000,000. Work on a major detector for the D-Zero Area began in FY 1985. Effective analysis of the large volumes of data to be generated by the TeV I will require an upgrading of Fermilab computing capacity and capability.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No.: 81-E-218

9. Purpose, Justification of Need for, and Scope of Project

When protons and antiprotons are stored in the superconducting Tevatron ring and brought into collision, the reaction energy available for particle production will be about 2000 GeV. This is almost 50 times greater than the reaction energy which is available at Fermilab when 1000 GeV protons strike a fixed target, although the interaction rates of the colliding beams are much lower than those of the fixed target program. This reaction energy will be sufficiently high to produce the W and Z intermediate vector bosons, which are the carriers of the weak nuclear force, and to study their properties. The data from experiments done at Fermilab and at other high energy accelerators have shown that the proton behaves as though it were made up of constituents. Past experience has clearly demonstrated that extending particle physics investigations into new, much higher reaction energies has proven to be of immense scientific value. A compelling scientific expectation is the likelihood of discovering totally unexpected phenomena at this new world record reaction energy.

10. Details of Cost Estimate

		Item Cost	Total Cost
a. Engineering, design and inspection at 17% of construction costs..			$10,100
b. Construction costs..			60,100
1. Conventional construction..................................		$24,300	
a. Experimental areas..	$11,600		
b. Ring and beam line housing................................	12,700		
2. Special facilities...		35,800	
a. Antiproton source...	23,500		
b. Accelerator components....................................	12,300		
c. Contingency at 20% of above costs..........................			13,800
Total...			$84,000

11. Method of Performance

Design of facilities will be by the operating contractor and subcontractors as appropriate. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No.: 81-E-218

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project costs:								
1. Total facility costs:								
(a) Construction line item...	$1,211	$ 4,182	$11,845	$29,517	$19,794	$13,000	$ 4,451	$ 84,000
Total facility costs.....	$1,211	$ 4,182	$11,845	$29,517	$19,794	$13,000	$ 4,451	$ 84,000
2. Other project costs:								
(a) Direct R&D operating costs necessary to complete construction...	2,221	3,337	13,268	21,262	7,000	1,075	0	48,163
(b) Capital equipment in support of R&D..........	621	368	702	357	293	0	0	2,341
Total other project costs	$2,842	$ 3,705	$13,970	$21,619	$ 7,293	$ 1,075	$ 0	$ 50,504
Total project costs (Items 1 & 2)...........	$4,053	$ 7,887	$25,815	$51,136	$27,087	$14,075	$ 4,451	$134,504

b. Total related incremental annual funding requirements (estimated life of project: 20 years)

1. Facility operating costs..	$- 3,000*
2. Programmatic operating expenses directly related to the facility..............................	2,500
3. Capital equipment not related to construction but related to the programmatic effort in the facility..	3,000
4. GPP, AIP programmatic costs..	500
Total other related annual funding requirements..	$ 3,000

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*Reference item 13.b. for explanation.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois 2. Project No.: 81-E-218

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding:

1. Total facility costs

(a) Construction line item - explained in items 8, 9 and 10.

2. Other Project Funding:

(a) Direct R&D operating costs - Studies of stochastic cooling techniques will continue. R&D on the antiproton production target system and the accumulator ring are now in progress. R&D on other elements of the project, to optimize performance and minimize the costs of various subsystems, will continue through the late stages of construction.

(b) Other project-related costs - The items included in these costs are magnets, power supplies, electronics and other general equipment to support a.2(a) above.

b. Total related annual funding requirements - It is assumed that after Tevatron I comes into operation approximately one-half of Fermilab accelerator operations time will be for colliding beams. This means that the fixed target experimental areas will not be operating one-half of each year. During the colliding beam operating period, there will be a net reduction of power consumption at Fermilab of about 15 Megawatts compared to running full time for fixed target experiments, which corresponds to a savings of about $3,000,000 over six months at current power rates. The programmatic effort in the facility will require approximately 30 additional people, and additional material and supplies are required to effectively operate the facility. The acquisition of research detectors for Tevatron I will be made with capital equipment funds. In the future, it is anticipated that major detector upgrades will be required about every three years. GPP and AIP funds will be required as experience in operating the new antiproton source and utilizing the Tevatron as a storage ring indicates specific areas where improvements would be more beneficial.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
GENERAL SCIENCE AND RESEARCH
HIGH ENERGY PHYSICS
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Stanford Linear Collider (SLC)
Stanford Linear Accelerator Center (SLAC)
Stanford, CA

2. Project No. 84-ER-133

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3. Date PE&D initiated: 2nd Qtr. FY 1980

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date Construction ends: 2nd Qtr. FY 1987

5. Previous cost estimate: $114,272,000
Less amount for PE&D: 2,272,000
Net cost estimate: $112,000,000
Date: October 1983

6. Current cost estimate: $117,672,000
Less amount for PE&D: 2,272,000
Net cost estimate: $115,400,000
Date: November 1984

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 32,000	$ 32,000	$ 32,000	$ 23,094
1985	60,500	60,500	60,500	49,552
1986	21,924	21,924	21,924	39,000
1987	976	976	976	3,754
Total	$115,400	$115,400	$115,400	$115,400

8. Brief Physical Description of Project

The SLAC Linear Collider (SLC) is a new type of electron-positron colliding beam facility which is an important step toward reducing the cost of very high energy electron-positron colliding beam devices to permit extension of the upper limit in energy above that which is at present fiscally feasible. The SLC will be constructed on non-government owned property at the Stanford Linear Accelerator Center (SLAC) which is located on Stanford University property. Its operation is based on the acceleration, in the linac, of an intense positron bunch and an intense electron bunch to energies of approximately 50 GeV each. At the end of the linac, the two bunches are injected in opposite directions into two arcs of magnets, arriving at a collision point where an effective interaction energy of approximately 100 GeV is achieved. After the collision point, the particles are disposed of and not used again. Because the beam is used only once, the magnets in the ring can have small aperture and, hence, low cost. Compared to storage rings, the single pass collider system operates at a relatively low repetition rate but makes up for the low collision frequency by the extremely high current densities which can be achieved at the collision point.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Stanford Linear Collider (SLC)
Stanford Linear Accelerator Center (SLAC)
Stanford, CA

2. Project No. 84-ER-133

8. Brief Physical Description of Project (continued)

The main components of the SLC are the energy upgrade of the SLAC linac; a transport system from the end of the linac to the small aperture magnet arcs; the magnet arcs themselves which includes the special focusing systems required near the interaction point; the necessary beam housing; an experimental hall and staging area; a high power positron production target at the 2/3rd point of the linac; a positron booster; a transport system from the positron target back to the injection end of the linac; a high peak current electron gun; two small storage rings, called damping rings, to reduce the emittances of the electron and positron beams by radiation damping; pulse compressors to reduce the length of the bunches in the storage rings before injection back into the linac; and the necessary instrumentation and control systems.

Since the SLC involves a new type of colliding beam system, its operation and the function of the various components are described below. A bunch of positrons containing approximately 5×10^{10} particles is injected into the SLAC linac. A single intense electron bunch, also of 5×10^{10} particles, is injected into the linac approximately 20 meters behind the positron bunch. A second electron bunch is injected behind the first intense electron pulse. This second electron bunch is used for the production of a new positron bunch. The first two bunches are accelerated in the linac to an energy of about 50 GeV. At the end of the linac a splitter takes the leading intense positron and the first electron bunch and starts them around the two magnet arcs in opposite directions. The function of the arcs is to transport the electron and positron bunches to a collision area where they collide head-on. In the collision area a collection of special lenses focuses the beams to a cross section of about 2 micron diameter at the collision point. After the beams pass through each other at the collision point they are disposed of and not used again.

The second electron bunch, which travels down the linac behind the electron and positron bunches, is deflected out of the linac at the two-thirds point and is directed onto a positron production target. Positrons from this production target are boosted to an energy of around 0.2 GeV by a short section of linac and transported by a separate magnetic-optical system back to the injector end of the main linac. There they and two new electron bunches from the electron gun/injection system are boosted to an energy of approximately 1.2 GeV and put into damping rings. In the damping rings the size of the beams decreases through synchrotron radiation damping to the appropriate value for re-injection into the main linac. The damping time for positrons is longer than the approximately 5 milliseconds between pulses of the collider system and, therefore, this ring must store two bunches simultaneously. The positron bunch which has been stored for the longest time is the one which is ejected from the damping ring and injected into the linac for the next pulse. During the time the .2 GeV positron beam is traveling back to the injector end of the linac, the high current electron gun produces two short pulses of electrons.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Stanford Linear Collider (SLC)
Stanford Linear Accelerator Center (SLAC)
Stanford, CA

2. Project No. 84-ER-133

8. Brief Physical Description of Project (continued)

These are timed to arrive at the injector just after the .2 GeV positron bunch. All three bunches of particles are accelerated in tandem through the first 100 M of the linac to 1.2 GeV energy. The positron bunch is switched to the positron damping ring and the two electron bunches into the electron damping ring. At the start of the next cycle one of the positron bunches and the two electron bunches are extracted from the damping rings, compressed longitudinally to a length of about 1 mm and injected into the linac. This total process is then repeated over and over again at the repetition rate of the linac.

9. Purpose, Justification of Need for, and Scope of Project

The SLC has two goals. First, it will develop and serve as a first test of a new colliding beam technique. This is a critical step toward achieving electron-positron collisions at much higher center-of-mass energies at lower cost per GeV than the technology used up to now -- that of the Colliding Beam Storage Rings (CBSR). Second, the SLC will increase the center-of-mass energy available for electron-positron experiments by a factor of about three above that now available at existing electron-positron CBSR's. The relatively low cost of the SLC, itself, is achieved by virtue of the fact that it uses the existing 2-mile linac.

The highest energy electron-positron colliding beam storage rings now in existence are the PEP Project at SLAC and PETRA at Hamburg, West Germany with center-of-mass energies of around 30-40 GeV respectively. The next step in circular colliders is the LEP machine, now being built by CERN physicists and engineers, which will achieve a maximum center-of-mass energy of about 120 GeV, initially with conventional radio frequency (RF) and subsequently as high as 240 GeV with superconducting RF. The version with conventional RF is estimated to cost about 1 billion Swiss Francs in 1981 value, not including labor costs.

In order to make use of the existing single linac at SLAC, the SLC has two arcs of magnets to guide the electron and positron bunches in different directions from the linac to the collision point. At the planned 50 GeV beam energy level the synchrotron radiation emitted in these magnets has a negligible effect on the total power required to operate the facility, while allowing it to be based on a single linac rather than two linacs. This project will not only provide critical input for a new accelerator technology, which promises to reduce costs for future generations of electron-positron machines, but will also contribute to a better understanding of the physical world through the important new experiments which it will make possible.

CONSTRUCTION PROJECT DATA SHEETS

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1. Title and location of project: Stanford Linear Collider (SLC)
Stanford Linear Accelerator Center (SLAC)
Stanford, CA

2. Project No. 84-ER-133

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9. Purpose, Justification of Need for, and Scope of Project (continued)

From recent research, a new theoretical concept has emerged which interprets both the weak and electromagnetic forces as different manifestations of one basic force. This concept is a form of gauge theory; the simplest form is the "standard model" of Weinberg and Salam. All of the variants of the gauge theory have one or more heavy particles which interact with the electron-positron system in the same basic way as does the ordinary zero mass photon. It is the interaction of this heavy gauge particle (Z^0) and its charged companions (W^+ and W^-) that is responsible for the properties of what is called the weak interaction. The gauge theories have had such success in explaining apparently unrelated facts that they are generally believed to be correct.

The SLC is designed to have a total energy large enough to copiously produce the neutral gauge particles, resulting in many hundreds of events per hour. The decay of these Z^0's into quarks, leptons, and perhaps other more exotic particles, will give a vast amount of information about a broad spectrum of basic physics questions ranging from the number of elementary building blocks which make up our world, and to the conditions in the early universe when it was only a few seconds old. The first evidence for the gauge particles has been found at the CERN antiproton-proton collider, but production rates are so low that experiments on this machine can give only a small fraction of the important, detailed information that can be obtained from the SLC.

Funds for detection apparatus to be used for high energy physics experiments with the SLC are included in the capital equipment budget. Equipment funds are being used to upgrade an existing detector (Mark II) previously used for lower energy experiments at PEP and for a new detector designed specifically for SLC physics. The Mark II upgrade ($11M) will be completed in FY 1986 so as to be available for physics research when SLC comes into operation early in FY 1987. Work on the new detector, called SLD, was initiated in FY 1985. SLD is expected to be completed by FY 1990, with a total DOE cost of about $40M.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Stanford Linear Collider (SLC)
Stanford Linear Accelerator Center (SLAC)
Stanford, CA

2. Project No. 84-ER-133

10. Details of Cost Estimate

	Item	Total Cost
A. ED&I (Excludes previously funded Plant Engineering & Design ED&I) @ 20% of construction costs, item B.		$ 16,500
B. Construction Cost:		84,000
1. Site Work, Utilities, and Structures including a) Experimental Hall; b) Collider Housing, and c) Linac-Collider Connection Tunnels	$ 25,500	
2. Accelerator components: a) Electron and Positron Sources; b) Energy Upgrade; c) Collider Arcs; and d) Focusing, Damping and Control Systems	58,500	
C. Standard Equipment (Cranes)		400
D. Contingency @ approximately 14% of above costs		14,500
E. Total		$115,400

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Stanford Linear Collider (SLC)
Stanford Linear Accelerator Center (SLAC)
Stanford, CA

2. Project No. 84-ER-133

11. Method of Performance

Design of conventional facilities will be accomplished by subcontracts. Design of technical components will be by the operating contractor (SLAC). To the extent feasible, construction procurement and installation will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	Total
A. Total Project Costs:						
1. Total Facility Costs:						
(a) Construction Line Item	$ 0	$23,094	$49,552	$39,000	$ 3,754	$115,400
(b) PE&D	2,272	0	0	0	0	2,272
(c) Expense Funded Equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total Direct Costs	2,272	23,094	49,552	39,000	3,754	117,672
2. Other Project Costs:						
(a) R&D Necessary to Complete Construction	0	9,867	6,713	3,736	0	20,316
(b) Other Project Related Costs:						
(1) R&D Related Capital Equipment.	0	412	300	350	0	1,062
Total Other Project Funding	0	10,279	7,013	4,086	0	21,378
Total Project Costs (Items 1 & 2)	$ 2,272	$33,373	$56,565	$43,086	$ 3,754	$139,050

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Stanford Linear Collider (SLC)
Stanford Linear Accelerator Center (SLAC)
Stanford, CA

2. Project No. 84-ER-133

12. Funding Schedule of Project Funding and Other Related Funding Requirements

B. Other Related Incremental Annual Costs in FY 1986 dollars (Estimated life of project: 10 years)

1. Facility operating costs (including incremental power costs)	$13,600
2. Programmatic operating expenses directly related to the facility	2,500
3. Capital equipment not related to construction but related to the programmatic effort in the facility	500
4. GPP or other construction related to programmatic effort in the facility	400
Total related incremental annual costs in FY 1986 dollars	$17,000

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Facility

(a) Construction Line Item (no narrative required)

(b) PE&D - The SLC is a totally new kind of colliding beam system, and although the basic technology involved is well understood, the project has benefited immeasurably from Plant Engineering and Design (PE&D) funding to more firmly establish component costs and conventional facility costs and schedules. The project was provided with $300,000 of PE&D funding in FY 1980, $750,000 in FY 1981, $907,000 in FY 1982, and $315,000 in FY 1983. The FY 1980 PE&D money funded a preliminary geological study of the site, preliminary tunnel and experimental hall design, and the study of alternative site layouts. The FY 1981 PE&D funding was allocated to more detailed structural design (Title I) of the linac/collider and connecting tunnels. In June 1981, SLAC retained the services of Tudor Engineering as an A/E firm to perform Title I and Title II design on the SLC project. The FY 1982 and FY 1983 PE&D funding supported completion of Title I and partial Title II design for SLC conventional facilities.

1. Title and location of project: Stanford Linear Collider (SLC)
Stanford Linear Accelerator Center (SLAC)
Stanford, CA

2. Project No. 84-ER-133

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (continued)

(c) Expense Funded Equipment - none anticipated for this project.

(d) Inventories - no inventories are anticipated for this project.

2. Other Project Funding

(a) R&D Necessary to Complete - funds provided in High Energy Physics Research, Accelerator Research and Development.

(b) Other Related Funding Provide the capital equipment and plant funding needed in support of the R&D effort.

B. Total Related Funding Requirements:

The programmatically useful lifetime of the facility is estimated to be about 10 years.

1. Facility operating costs include the incremental costs of accelerator operations, experimental area operations, and related research and development efforts. These costs are for salaries, electric power, materials and supplies, with the dominant cost element being the electric power charges.

2. Programmatic Operating Expenses Directly Related to the Facility - this estimate is for high energy physics research to be performed by SLAC in-house physicists or physicists from the user community.

3. Capital Equipment Related to the Programmatic Effort in the Facility - this estimate is for general capital equipment needed to support research at the facility. It will provide for upgrading research detectors, data recording and analysis instrumentation and miscellaneous laboratory instruments. It does not provide for any major detection system.

4. GPP or Other Construction Related to Programmatic Effort - this estimate is a general "level of effort" which would provide for minor structures and utility extensions as well as modifications and improvements (AIP) of the facility to maintain its scientific effectiveness and productivity.

5. Other Costs - no narrative required.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
GENERAL SCIENCE AND RESEARCH
HIGH ENERGY PHYSICS

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Central Computing Upgrade
Fermi National Accelerator Laboratory
Batavia, Illinois

2. Project No.: 86-R-104

3. Date A-E work initiated: 1st Qtr. FY 1986

3a. Date physical construction starts: 2nd Qtr. FY 1986

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: $23,900
Less amount for PE&D:
Net Cost estimate: $23,900
Date: November 1984

Current cost estimate: $24,100
Less amount for PE&D: 0
Net cost estimate: $24,100
Date: August 1985

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1986	$ 23,900	$ 2,968	$ 2,968	$ 2,000
1987	0	14,157	14,157	9,000
1988	0	6,975	6,975	13,100
Total	$ 23,900	$ 24,100	$ 24,100	$ 24,100

8. Brief Physical Description of Project

The proposed project is comprised of two parts:

a) The acquisition of a major computing capacity and capability upgrade, including additional central processors, additional disc and tape storage devices, and additional interfaces to support both online user terminals and access to special purpose data processors designed for the particular requirements of high energy physics data analysis.
b) A building to house the upgraded central computing system and support personnel.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central Computing Upgrade
Fermi National Accelerator Laboratory
Batavia, Illinois

2. Project No.: 86-R-104

9. Purpose, Justification of Need for, and Scope of Project

a. Central Computing System Upgrade

Fermilab's central computing facility serves a wide variety of needs, the major ones being the analysis of data from experiments, theoretical physics calculations, accelerator design calculations, and stress analysis and magnetic field calculations used in the design of magnets and other equipment. A large central computing facility has proven itself to be the most cost-effective solution to these computing needs in terms of hardware and software support, utilization of peripherals, and flexibility of computer configurations. The Fermilab central computing facility represents the only major facility of this kind which is accessible to the U.S. university participants in Fermilab experiments for the analysis of their data. At present the Fermilab central computing facility consists of three Cyber 175 computers. A lease-purchase contract for additional hardware will increase the total capacity to the equivalent of seven Cyber 175's in the period FY 1984 - FY 1986. However, an evaluation of the projected computing load has indicated that another increase in the computing capacity of at least a factor of five will be needed in FY 1986 - FY 1987. This increase in load is primarily due to the large additional data analysis requirements of the new colliding beam detectors for Tevatron I. The computer system upgrade requested here will meet these new needs, and will be chosen to provide the basis for growth during the remainder of the 1980's as the accelerator intensity improves and the experiments are refined.

b. Building to house Upgraded Central Computing System

Since 1973 Fermilab's central computing system, tape storage, and on-line computer maintenance have been housed in Wilson Hall. Growth in subsequent years has now led to a degree of congestion which is severely affecting the efficiency and reliability of these operations. Since additional space in Wilson Hall to house additional computing hardware is unavailable, it is proposed to move these activities to a separate building specifically designed for this usage, where it will also be much easier to provide proper security for the very high value equipment which is involved.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central Computing Upgrade
Fermi National Accelerator Laboratory
Batavia, Illinois

2. Project No.: 86-R-104

10. Details of Cost Estimate

		Part A Computer Upgrade Total Cost	Part B Building Item Cost	Part B Building Total Cost
a. Engineering, design and inspection at 2.3% of Procurement and Installation (Part A) and 10.6% of construction costs (Part B)..		$ 300		$ 700
b. Construction costs..				6,800
1. Improvements to land including road, parking & landscaping...			$ 300	
2. Building...			6,400	
a. Basic Structure................	$3,800			
b. Mechanical.....................	1,600			
c. Electrical.....................	900			
d. Conveying System (Elevator)....	100			
3. Utilities..			100	
4. Procurement..		13,500		
5. Installation...		200		
Subtotal..		$14,000		7,500
c. Contingency at approximately 11% of the above cost for Part A and 15% for Part B..		1,500		1,100
Total Estimated Cost by Part..............................		$15,500		$ 8,600
Total Estimated Cost..................................				$24,100

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central Computing Upgrade
Fermi National Accelerator Laboratory
Batavia, Illinois

2. Project No.: 86-R-104

11. Method of Performance

Design of conventional and special facilities will be by the operating contractor. To the extent feasible, construction, procurement, and installation will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and other Related Funding Requirements

	FY 1986	FY 1987	FY 1988	Total
a. Total project costs				
1. Total facility costs				
a. Construction line item..........	$ 2,000	$ 9,000	$13,100	$24,100
2. Other project costs				
a. Existing equipment relocation....	0	50	50	100
Total project costs.................	$ 2,000	$ 9,050	$13,150	$24,200

b. Other related annual funding requirements (estimated life of project: 25 years)	
1. Building maintenance and operating cost (including power)................................	$ 600
2. Programmatic operating expenses directly related to the computing facility..............	12,000
3. Capital equipment not related to construction but related to the programmatic effort in the computing facility..	1,500
4. GPP or other construction related to programmatic effort in the facility................	0
Total related annual funding requirements..	$14,100
Less: Costs associated with the operation of the existing computing facility in its present location..	- 9,900
Net incremental annual costs resulting from the construction of the new building and the operation of the upgraded computing facility.	$ 4,200

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Central Computing Upgrade
Fermi National Accelerator Laboratory
Batavia, Illinois
2. Project No.: 86-R-104

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project costs:

1. Construction Line Item (No Narrative Required)

2. Other project costs
   a. Existing equipment relocation - the existing computing equipment presently located in Wilson Hall will be relocated to the new building as construction is completed, at an estimated cost of $100,000.

b. Total related annual funding requirements. It is estimated the facility will be used 25 years for its programmatic purpose.

1. Facility operating costs. The major elements comprising the annual operating costs are electricity for lighting and air conditioning, natural gas for heating and labor for custodial and maintenance.

2. Programmatic operating expenses directly related to the facility. The estimate given here is based on the cost of the programmatic effort presently being provided for the existing facility.

3. Capital equipment not related to construction but related to the programmatic effort in the facility. This represents an appropriate funding level for central computer system enhancements.

4. GPP - No narrative required.

5. General - The net incremental costs to operate the upgraded facility are shown in item 12 at $4,200,000. The present Fermilab central computing facility is currently operational in its Wilson Hall location and would incur an annual expense of about $9,900,000 in FY 1986. These costs would continue if the upgrade were not undertaken. The incremental costs cover items such as additional personnel, hardware and software maintenance charges, custodial, maintenance, and repair needs for the building, as well as utility costs. It has been assumed that the electrical power cost at the new facility will be partially offset by savings at Wilson Hall.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
GENERAL SCIENCE AND RESEARCH
HIGH ENERGY PHYSICS
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: AGS Accumulator/Booster
Brookhaven National Laboratory
Upton, NY

2. Project No.: 86-R-105

3. Date A-E work initiated: 1st Qtr. FY 1986

3a. Date physical construction starts: 3rd Qtr. FY 1986

4. Date Construction ends: 4th Qtr. FY 1989

5. Previous cost estimate: none

6. Current cost estimate: $26,400
Less amount for PE&D: 0
Net cost estimate: $26,400
Date: May 1985

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1986	$ 2,000	$ 1,915	$ 1,915	$ 1,100
1987	24,400	3,500	3,500	3,500
1988	0	16,085	16,085	12,100
1989	0	4,900	4,900	9,700

8. Brief Physical Description of Project

The Accumulator/Booster (A/B ring) is a rapid cycling synchrotron that acts as a booster injector to the Alternating Gradient Synchrotron (AGS) for both protons and heavy ions and as an accumulator and injector for polarized protons. Protons and polarized protons will be injected into the A/B ring at 200 MeV from the existing linac and accelerated to 1.0 GeV for injection into the AGS. Heavy ions will be injected into the A/B ring and accelerated to a maximum energy which depends on the particular heavy ion, then stripped and injected into the AGS. The transfer line to carry the heavy ions from the Tandem Van de Graaff to the AGS is under construction and will be finished during FY 1985.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: AGS Accumulator/Booster
Brookhaven National Laboratory
Upton, NY

2. Project No.: 86-R-105

8. Brief Physical Description of Project

The Accumulator/Booster will have a circumference of 201 meters which is equal to 1/4 that of the AGS. This will allow efficient, synchronous bucket-to-bucket transfer of beam from the A/B ring to the AGS. The balance of the machine is designed with the objective of making it simple, relatively inexpensive, capable of accelerating protons to about 1 GeV, capable of accumulating polarized protons, and capable of accelerating heavy ions.

The lattice chosen is a FODO arrangement with bending magnets missing from every other cell. The Accumulator/Booster will utilize separated function magnets. This will minimize end effects in a lattice which has such a small packing factor. Magnetic field cycling requirements are up to 4 kG at 10 Hz rate for 1 GeV protons and 12 kG at 1 Hz rate for heavy ions. The heavy ion acceleration aspect is the determining constraint on the magnet specifications. The power supply requirements for both cases are almost identical. The tune and aperture of the ring are chosen to avoid depolarizing resonances, to match to the admittance of the AGS, and to be flexible enough to accommodate research and development of devices and techniques for the acceleration and storage of polarized protons. To cover the ion velocities of approximately 0.04 to 0.875 of the speed of light, the rf system consists of three cavities, one for protons and two for heavy ions, each covering a different frequence range.

The A/B ring will be housed in a ring building located in the vee formed by the junction of the 200 MeV linac building and the old 50 MeV linac building. This is very close to the AGS injection system and near the end of the transfer line from the Tandum. The existing 50 MeV linac building will serve as part of the A/B ring enclosure as well as house all power supplies necessary for this project. It will also serve as an assembly and staging area for ring elements prior to installation in the tunnel. Most of the ring will be located in a tunnel to be constructed north of the 50 MeV linac building, and two penetrations will enable the remaining 75-feet to be in the linac building itself. For most of the ring, the structural concrete and five feet of earth fill will provide the necessary radiation shielding.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: AGS Accumulator/Booster
Brookhaven National Laboratory
Upton, NY

2. Project No.: 86-R-105

9. Purpose, Justification of Need for, and Scope of Project

The Accumulator/Booster will improve the performance and capabilities of the AGS for (1) normal proton operation, (2) operation with polarized protons and (3) operation with heavy ions. In each of these three modes of operation, the increased capability will have direct and immediate benefits by making accessible areas of science not previously accessible or by significantly increasing the data collection rate for the experimental program already planned and underway at the AGS.

(1) Normal Proton Research

When operating for normal proton research, the Accumulator/Booster will be used to accelerate protons to 1.0 GeV for injection into the AGS. At present injection is at 200 MeV. Injection at the higher energy will increase the space charge limit for the circulating beam and result in an increase of the extracted proton beam intensity by a factor of four to about 5 x 10^{13} protons per pulse.

For over two decades the Alternating Gradient Synchrotron has produced a steady flow of important physics, including major discoveries such as CP violation, the muon neutrino, the omega minus, the J/Psi, and the first charmed baryon. Today this machine is still the center of a vigorous research program, with experiments studying quantum chromodynamics via the search for glueballs and hard scattering exclusive reactions, searching for neutrino oscillations, and pushing the limits of the most complete theory, quantum electrodynamics, by measuring the vacuum polarization. In preparation are studies of extremely rare K decays via flavor changing neutral currents, which probe beyond the standard model to test very high energy theories like supersymmetry and technicolor. The increased beam intensity provided by the Accumulator/Booster will enhance this entire program but is of special importance to the rare K decay experiments.

1. Title and location of project: AGS Accumulator/Booster
Brookhaven National Laboratory
Upton, NY

2. Project No.: 86-R-105

9. Purpose, Justification of Need for, and Scope of Project (continued)

(2) Polarized Proton Research

When operating for polarized proton research, the Accumulator/Booster will be used to accumulate 20-30 linac pulses for subsequent injection into the AGS. This will increase the extracted polarized proton beam intensity by the same factor of 20-30. The polarized proton beam intensity which is available initially at the AGS will be adequate for the initial round of experiments, but the follow-on experiments will be limited by the available beam intensity. Much higher intensities are required to fully explore the physics of spin-dependent phenomena at AGS energies. The Accumulator/Booster, with the present polarized proton source, will result in a beam intensity of about 2×10^{11} protons per pulse.

The AGS has been modified to allow the acceleration of polarized protons. Initial research operation at low energy occurred late in FY 1984. The polarized proton beam intensity which is available initially at the AGS will be adequate for the initial round of experiments, but the follow-on experiments will be limited by the available beam intensity. The projected factor of 20 improvement will substantially improve the quality and cost effectiveness of the presently planned experimental program and allow consideration of new experiments where the increased beam intensity would be essential.

(3) Heavy Ion Research

When operating for heavy ion research, the Accumulator/Booster will accelerate partially stripped heavy ions from the existing Tandem Van de Graaff. The ions emerging from the Accumulator/Booster will have sufficient energy to allow them to be fully stripped with high efficiency before injection into the AGS. Because of the vacuum system considerations the AGS can only accelerate fully stripped heavy ions; the maximum energy available from the Tandem itself is such that only light ions (sulfur and below) can be fully stripped. The transfer line project which is presently underway will make available at the AGS beams of fully stripped high energy heavy ions up to sulfur. The Accumulator/Booster coupled with the Tandem will extend the heavy ion capability of the AGS to include heavy ions up to gold. The accelerated beam intensity of 2×10^{9}/pulse for Au, as an example, is a factor of 10^{5} greater than presently available at any other machine at energies greater than 1 GeV/amu. For the particular example of Au, the accelerated beam intensity is at the calculated space charge limit of the A/B ring.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: AGS Accumulator/Booster
Brookhaven National Laboratory
Upton, NY

2. Project No.: 86-R-105

10. Details of Cost Estimate*

		Item Cost	Total Cost
a. Engineering, design and inspection at 31% of construction cost (17% of conventional construction and 33% of special facilities)		$	$ 5,100
b. Construction Cost			16,900
1. Conventional Construction		2,000	
Tunnel and utilities	$ 2,000		
2. Special Facilities and Accelerator Systems		14,900	
Magnets	5,500		
Magnet power supplies	2,600		
Other Systems	6,800		
c. Contingency at approximately 20% of above cost			4,400
Total estimated costs			$26,400

*Based on Completed Conceptual Design.

11. Method of Performance

Building design will be on the basis of a negotiated AE contract and its construction will be a competitively obtained lump sum contract. Design, assembly, and testing of the special facilities and accelerator system will be done by the staff of the Brookhaven National Laboratory. Component parts, wherever posible, will be fabricated by industry under fixed-priced competitively-obtained procurement actions.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: AGS Accumulator/Booster
Brookhaven National Laboratory
Upton, NY

2. Project No.: 86-R-105

12. Funding Schedule of Project Funding and Other Related Funding Requirements

a. Total project costs	FY 1986	FY 1987	FY 1988	FY 1989	Total
1. Total facility costs					
(a) Construction line item............	$ 1,100	$ 3,500	$12,100	$ 9,700	$26,400
Total facility costs..............	$ 1,100	$ 3,500	$12,100	$ 9,700	$26,400
2. Other project costs					
(a) R&D necessary to complete construction.....................	200	200	100	0	500
Total other project costs.........	200	200	100	0	500
Total project costs (Item 1 & 2)...........	$ 1,300	$ 3,700	$12,200	$ 9,700	$26,900

b. Other related annual funding requirements (in FY 1987 dollars)

1. Facility operating costs..	$ 1,100
2. Capital equipment not related to construction...	100
Total related annual funding requirements..	$ 1,200

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: AGS Accumulator/Booster
Brookhaven National Laboratory
Upton, NY

2. Project No.: 86-R-105

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding

1. Total facility costs

(a) Construction line item - explained in Items 8, 9 and 10.

2. Other project costs

(a) R&D necessary to complete construction - includes development of beam instrumentation, controls concepts and computer software at a cost of $500,000.

b. Total related annual funding requirements

1. Operating costs - There will be an annual requirement for additional FTE's with additional materials, supplies and support services associated with the physics program.

2. Capital equipment not related to construction but related to the programmatic effort in the facility - These equipment funds will provide continual utilization growth of the facility through the acquisition of: new detectors monitoring equipment, and controls improvement, and general purchase capital items for the operating program.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
GENERAL SCIENCE AND RESEARCH
HIGH ENERGY PHYSICS
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No.: 87-R-101

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 3rd Qtr. FY 1987

4. Date Construction ends: 2nd Qtr. FY 1989

5. Previous cost Estimate: none
Less amount for PE&D: none
Net cost estimate: none
Date:

6. Current cost estimate: $11,500
Less amount for PE&D: 0
Net cost estimate: $11,500
Date: May 1985

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$11,500	$11,500	$11,500	$ 4,700
1988	0	0	0	5,900
1989	0	0	0	900

8. Brief Physical Description of Project

This project provides for a variety of minor modifications, improvements and additions to the major high energy particle accelerators, colliding beam devices and experimental facilities. Funds of this type are necessary on an annual basis to maintain and improve the effectiveness of these facilities. The funds requested, which represent less than 1 percent of the present value of the government's investment in these facilities, produce a substantial return in terms of more cost effective operation and greater research productivity.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations
2. Project No.: 87-R-101

8. Brief Physical Description of Project (continued)

The following are examples of the major items of work to be performed at the various locations:

Brookhaven National Laboratory.. $2,500,000

Funds are requested for modifications, improvements and additions to the Alternating Gradient Synchrotron (AGS) and its related experimental facilities. Items planned include: Replacement of preaccelerators with a high current RFQ accelerator; installation of a transverse and longitudinal damping system; upgrade of the linac injection system; upgrade of primary proton target stations for high intensity, beam shielding, and improvements to the AGS control system.

Fermi National Accelerator Laboratory.. $5,900,000

Funds requested are for modifications, improvements and additions to the Fermilab accelerator facilities (which includes the linear accelerator, booster synchrotron, main ring, Tevatron and antiproton source rings) and to the switchyard, beam lines, target facilities and experimental areas.

Modifications to the accelerator facilities are expected to include: Low beta magnet and power supply system improvements incorporating the improved superconducting materials now available; upgrade of the Cryogenic Accelerator including improved magnet and cryogenic systems; accelerator controls improvements to provide for more sophisticated control systems for the Accelerator complex, including the Linac, Booster, Main Ring, Tevatron and Anti-protron source; improved instrumentation to cope with the increased demands made on the accelerator system by antiprotron production, colliding beam operations and fixed target operations.

Modifications to the experimental facilities are expected to include: Upgrading of beam line diagnostics and control systems and beam line improvements including magnets, power supplies and enclosures to accommodate new beamlines and experiments; additional shielding for the secondary beam enclosures in the experimental area; provisions for secondary beam energy upgrade; and modifications to provide improved test beam facilities.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations
2. Project No.: 87-R-101

8. Brief Physical Description of Project (continued)

Stanford Linear Accelerator Center (SLAC).. $3,100,000

Funds are requested for modifications, improvements and additions to the SLAC linear accelerator and PEP colliding beam facilities, and to the associated experimental facilities. Items now planned for FY 1987 include: Provide for replacement of sub-booster klystrons and associated modulators with microwave solid-state amplifiers; provide for extended linac quadrupole focusing to control emittance growth; improve steering and position monitors; improvements necessary to produce polarized electrons and control vertical and horizontal polarization; provide upgrades to instrumentation and control systems to improve operating efficiency.

9. Purpose, Justification of Need for, and Scope of Project

Accelerator improvements are essential on an annual basis to maintain the short term operating efficiency and reliability, and the research flexibility of the high energy accelerators, colliding beam systems and related experimental facilities, thereby maintaining or enhancing their level of scientific effectiveness and productivity. Research advances and facility requirements in high energy physics occur at a rapid pace; further, each research facility is a unique assemblage of very specialized, high technology components. Consequently, there is a continuing need to modify facilities, frequently on a short time scale, in response to research needs and to respond to problems that can affect the reliability, efficiency and economy of operation on a time scale shorter than the normal two-year budget cycle. The requested accelerator improvements and modifications will provide greater flexibility for experimental setups, increased performance levels, and increased serviceability, thereby decreasing facility downtime, improving the productivity, scientific effectiveness and cost effectiveness of the U.S. program in High Energy Physics.

Since needs and priorities may change, other subprojects may be substituted for some of those listed. Some of these will be located on non-Government owned property.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No.: 87-R-101

10. Details of Cost Estimate

a. Engineering, design and inspection and component assembly and installation	$11,500
Total Estimated Cost	$11,500

The estimated costs of the programs at each laboratory are preliminary and, in general, indicate the magnitude of each program.

11. Method of Performance

Design will be primarily by contractor staff. To the extent feasible, construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
GENERAL SCIENCE AND RESEARCH
HIGH ENERGY PHYSICS

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General Plant projects, various locations

2. Project No.: 87-R-102

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 2nd Qtr. FY 1987

4. Date Construction ends: 2nd Qtr. FY 1989

5. Previous cost estimate: none
Date: none

6. Current cost estimate: $11,200
Less amount for PE&D: 0
Net cost estimate: $11,200
Date: May 1985

7. Financial Schedule

Fiscal Year	Obligations	Costs FY 1985	Costs FY 1986	Costs FY 1987	Costs After FY 1987
Prior Year Projects	XXXXXXX	$ 4,040	$ 2,300	$ 0	$ 0
1985	10,200	2,800	4,600	2,800	0
1986	9,957	0	2,100	4,800	3,057
1987	11,200	0	0	2,600	8,600
		$ 6,840	$ 9,000	$10,200	$11,657

8. Brief Physical Description of Project

These projects provide for the many miscellaneous alterations, additions, modifications, replacements, and non-major construction required at the Brookhaven National Laboratory, Fermi National Accelerator Laboratory and the Stanford Linear Accelerator Center facilities. GPP projects focus on the general laboratory facilities whereas AIP projects focus on the technical facilities.

The following are examples of the major items of work to be performed at the various locations:

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations   2. Project No.: 87-R-102

8. Brief Physical Description of Project (continued)

Brookhaven National Laboratory		$6,000
Building Addition - Alternating Gradient Synchrotron	$250	
Water Controls Upgrade - Alternating Gradient Synchrotron	200	
Storage Building Construction - Alternating Gradient Synchrotron	350	
Water System Improvements - Alternating Gradient Synchrotron	250	
Applied Science Laboratory Conversion	150	
Increased Power Supply to Experimental Laboratory	300	
Sanitary System Extension, Phase I	900	
Asbestos Removal, Various Facilities	800	
Construction of Safeguards and Emergency Services Building	500	
Closure for Former Waste Disposal Site	300	
Communication System Improvement	200	
Construction of Supply and Material Warehouse	900	
Replacement of Water Main, Phase II	600	
Various Projects (less than $100,000 each)	300	
Fermi National Accelerator Laboratory		$3,300
Main Ring Road Improvements	350	
Service Building Improvements	500	
Utility Improvements	450	
Addition to the Experimental Areas Operations Center	800	
Meson Detector Building Improvements	450	
Improvements to Industrial Buildings	500	
Various Projects (less than $100,000 each)	250	

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant rojects, various locations   2. Project No.: 87-R-102

8. Brief Physical Description of Project (continued)

Stanford Linear Accelerator Center		$1,900*
Stanford Positron Electron Asymmetric Ring trestle replacement	100	
Replacement of heating, ventilating and air conditioning equipment	400	
Replacement of hot water system piping	200	
Replacement of roofing at major buildings	300	
Addition to Main Control Building	900	

*These projects will be constructed at the Stanford Linear Accelerator Center on non-Government owned property.

9. Purpose, Justification of Need for, and Scope of Project

General plant projects are required for the general maintenance, modification and improvement of the overall laboratory plant and include minor new construction, capital alterations and additions, and improvements to buildings and utility systems. These are short-term projects whose timely accomplishment is essential for maintaining the productivity, increasing the operational cost effectiveness, and ensuring that necessary support services are available to the research program at the DOE-owned facilities. Since it is difficult to detail the most urgently needed items in advance, a continuing evaluation of requirements and priorities may result in additions, deletions, and changes to the currently planned subprojects. No significant R&D program is anticipated as a prerequisite for design and construction of the subprojects under consideration.

The funds requested for FY 1987 are estimated as follows:

Brookhaven National Laboratory	$ 6,000
Fermi National Accelerator Laboratory	3,300
Stanford Linear Accelerator Center	1,900
Total Estimated Cost	$11,200

Since needs and priorities may change, other subprojects may be substituted for those listed and some of these may be located on non-Government owned property.

DEPARTMENT OF ENERGY
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
NUCLEAR PHYSICS
GENERAL SCIENCE PROGRAM DIRECTION
VOLUME 4

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DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
NUCLEAR PHYSICS
GENERAL SCIENCE AND RESEARCH

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Nuclear Physics (NP)					
Medium Energy Nuclear Physics					
Operating Expenses..	$ 73,810[a]	$ 73,131	$ 73,131	$ 85,000	$+11,869
Subtotal..........	73,810	73,131	73,131	85,000	+11,869
Heavy Ion Nuclear Physics					
Operating Expenses..	49,008	50,150	50,150	63,700	+13,550
Subtotal..........	49,008	50,150	50,150	63,700	+13,550
Low Energy Nuclear Physics					
Operating Expenses..	13,322	12,087	12,087	15,700	+ 3,613
Subtotal..........	13,322	12,087	12,087	15,700	+ 3,613
Nuclear Theory					
Operating Expenses..	9,300	8,999	8,999	10,500	+ 1,501
Subtotal..........	9,300	8,999	8,999	10,500	+ 1,501
Capital Equipment.....	12,700	13,403	13,403	16,000	+ 2,597
Construction..........	23,300	6,702	6,702	33,300	+26,598
Total					
Operating Expenses....	145,440[c]	144,367	144,367	174,900	+30,533
Capital Equipment.....	12,700	13,403	13,403	16,000	+ 2,597
Construction..........	23,300	6,702	6,702	33,300	+26,598
Nuclear Physics.....	$181,440[b]/[d]	$164,472[d]/[e]/[f]	$164,472	$224,200[d]	$+59,728

Staffing Total FTE's .... (Reference General Science Program Direction Decision Unit)

Authorization: Section 209, Public Law 95-91.

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[a] Includes $3,100,000 Defense Programs support of Clinton P. Anderson Meson Physics Facility (LAMPF) operations.

[b] FY 1985 total reflects a reduction of $835,000 for ADP general reduction.

[c] FY 1985 total does not include $1,425,000 transferred to the SBIR program.

[d] Totals reflect a reduction of $1,300,000 in FY 1985, $2,500,000 in FY 1986, and $2,700,000 in FY 1987 for management initiative savings.

[e] $100,000 has been transferred to Assistant Secretary for Environmental Safety and Health.

[f] Total reduced by $7,328,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
NUCLEAR PHYSICS

(In thousands of dollars)

1986 Appropriation enacted	$171,800
1986 Gramm-Rudman reduction	- 7,328
1986 adjusted	$164,472
o Provide a cost-of-living increment to maintain a constant level of research activities and facility utilization	+ 9,870
o Implement Continuous Electron Beam Accelerator Facility (CEBAF) construction and continue R&D which supports the project	+26,180
o Using recently completed upgrade, conduct AGS heavy ion nuclear research program with 1000 beam hours for research and complete funding for initial complement of detectors	+ 7,150
o Provide for accelerator improvement and facility maintenance projects to meet programmatic needs and provide for general purpose equipment to meet laboratory-wide needs of Lawrence Berkeley Laboratory	+ 1,620
o Conduct program operations with overall facility utilization at 55% in FY 1987	+ 8,230
o Provide for university component of research at 25% of operating expenses and provide for internationally collaborative efforts in solar neutrino research	+ 4,058
o Conduct R&D in order to maintain U.S. leadership in accelerator technology	+ 2,620
1987 budget request	$224,200

Nuclear Physics

The Nuclear Physics program supports the basic research necessary to identify and understand the fundamental features of atomic nuclei and their interactions. Nuclear processes have guided the evolution of the universe, fueled solar burning, and determined the elemental composition of the earth. The nucleus is the arena of interplay of the primary forces of nature -- the strong nuclear force, the electromagnetic force, and the weak force. Nuclear studies continuously interact with other disciplines in order to maintain their currency in emerging problems. The study of nuclear physics consequently lies at the core of fundamental scientific research.

In terms of trained manpower, new knowledge, and advanced instrumentation, the Nuclear Physics program continues to be a vital factor in America's long-term investment in its technological future. Nuclear knowledge, techniques, instruments, and applications are an integral part of American society. These serve as the basis for our national defense strategy, for therapeutic and diagnostic medical applications, for generation of electricity with nuclear reactors (fission now and fusion in the future), and for a large and diverse array of applications in industry. Approximately 80% of the total Federal support of basic nuclear research is provided through the DOE Nuclear Physics program. Thus, the Department of Energy has the primary responsibility for this important area of basic science and its role in high technology.

The broad scope of the Nuclear Physics research program requires a variety of accelerator facilities, experimental equipment, and manpower skills. Different aspects of the questions being asked by scientists are addressed by beams of low energy light ions, heavy ions, electrons, medium energy protons, and relativistic (very high energy) heavy ions. Additional information is obtained by use of secondary beams (created by impinging primary beams on suitable targets) of neutrons, pi mesons (pions), K mesons (kaons), muons, photons, neutrinos, and radioactive nuclei. The new scientific challenges now facing basic nuclear research require advanced accelerators designed to provide the beams needed for the research.

The devices needed for detection of the products emitted in nuclear reactions also vary widely. At low energies, solid-state detectors made of germanium or silicon and scintillation counters using large transparent crystals are common. At higher energies, arrays of wire proportional chambers, drift chambers, plastic scintillator hodoscopes, and Cerenkov radiation detectors are used. At all energies, the use of magnetic spectrometers for measuring the momentum of charged particles is vital. A substantial R&D effort is devoted towards developing new detector techniques, and a significant commitment of resources is required to develop the new detectors which are essential to the success of planned experiments. However, in the final analysis, the most important ingredient for success is the continued presence of skilled and imaginative scientists -- experimentalists and theoreticians -- dedicated to solving the mysteries of the nucleus. The Nuclear Physics program relies upon a strong university component to provide scientists for basic nuclear research and to help meet America's need for manpower with high technology skills.

Long range planning, scientific community input, and coordination of Department of Energy work with National Science Foundation (NSF) activities will continue to take place through a variety of channels. The most important of these channels are external and internal review of specific research areas, frequent staff contact with counterparts at NSF, and the work of the DOE/NSF Nuclear Science Advisory Committee (NSAC).

Program Highlights

The body of knowledge in basic nuclear research has grown systematically over the years. Old problems have been resolved, and new questions have been asked. The path to new knowledge has had its share of surprises and frustrations. Sometimes the intractability of the problems has virtually stifled advancement. In other cases, a theoretical breakthrough or availability of new facilities or equipment has led to rapid progress. Advanced knowledge of nuclear structure has been enhanced by the availability of intense beams of polarized protons and deuterons. The use of polarized beams allows the determination of spin parameters of nuclear excitations in addition to knowledge of energies and decay modes. Sophisticated new gamma-ray spectrometers have been or are being installed at the Oak Ridge National Laboratory, at Argonne National Laboratory, and at the Lawrence Berkeley Laboratory's 88-Inch Cyclotron. These are leading to a new wealth of data on the mechanism by which nuclei become platter shaped when spinning at very high rates.

It has long been recognized that mesons, especially pions, provide the cement that holds nuclei together. Recent measurement of the rate of production of pions in high energy nucleus-nucleus collisions at the Lawrence Berkeley Laboratory's Bevalac has once again emphasized their omnipresent role. At the Bevalac, enhanced production of kaons and reduced production of pions tested the models of absorption of mesons in nuclear matter. The systematic study of the interaction of beams of free pions with nuclear targets at the Clinton P. Anderson Meson Physics Facility (LAMPF) at the Los Alamos National Laboratory has been a mainstay of the LAMPF program. In recent LAMPF experiments, pions have been used in double charge exchange measurements to explore new symmetries in nuclear excitations. At the Holifield Heavy Ion Research Facility (HHIRF) at Oak Ridge National Laboratory, pions have been detected emerging from nuclear collisions at beam energies far lower than previously believed possible. At the Massachusetts Institute of Technology's Bates Linear Accelerator Center, the delta particle (a close association of pions, protons, and neutrons) has been calculated to be a significant component of nuclei. And at Brookhaven National Laboratory's Alternating Gradient Synchrotron (AGS), beams of kaons have been used to make new states in hypernuclear images of conventional nuclei. The role of mesons as nuclear constituents and their utility as nuclear probes continues to be an important component of nuclear physics research.

Beyond the mesonic description however, new theoretical concepts are opening the door to a more profound level of understanding. Neutrons and protons are now described as composites of quarks and gluons, while mesons are composites of quark-antiquark pairs. Nuclear theorists, along with high energy theorists, are investigating the ways in which quarks are confined together in "bags" of three to make up neutrons and protons. A more fundamental theory of the nuclear force is emerging based on the quantum chromodynamics (QCD) model of quarks and gluons. This new theory alters in ever expanding ways the concepts and phenomena of nuclear physics. Exploring these concepts requires higher energies than have been available to the Nuclear Physics program. The theory provides a microscopic view of the way that mesons perform their binding function in nuclei. A glimpse into the role that quarks play in nuclei is being pursued using electron beams at the off-axis injector at the Stanford Linear Accelerator Center. The Continuous Electron Beam Accelerator Facility (CEBAF) is expressly designed to examine the transition region from pion-dominated to quark-dominated effects. It will generate precise beams of high energy electrons that will probe the quark structure of nucleons embedded in finite nuclei.

Another very different approach into the role of quarks in nuclei will be made possible by the Tandem/AGS Heavy Ion Transfer Line project at Brookhaven's AGS accelerator. This facility upgrade, scheduled for start of experiments in FY 1987, will allow the AGS to accelerate atomic nuclei to energies of up to 14 billion electron volts per atomic mass unit (GeV/AMU). These beams will collide with massive nuclei at rest in the laboratory to produce hot, dense nuclear matter, relaxing the confinement conditions which prevent the quarks from escaping from their nucleonic bags.

At even higher energies, collisions of heavy ions would permit formation of a quark-gluon plasma, in which the quarks and gluons interact freely over the volume of the entire nucleus. Calculations simulating this plasma have been a major theoretical activity over the last few years. This plasma would create conditions in the laboratory which existed only a few millionths of a second after the "Big Bang" of creation. A preliminary glimpse into this area of physics will be provided by cooperative experiments at the CERN Laboratory in Geneva, Switzerland. In FY 1987, CERN plans two 17-day experimental running periods in which oxygen nuclei (16 atomic mass units) will be accelerated to energies up to 225 GeV/AMU. American scientists supported by the Nuclear Physics program are leaders in many of the experiments designed to capitalize on this window of opportunity.

Just as theory has made dramatic advances, so has the technology of accelerators and experiments improved. Superconducting linear accelerator elements have been designed, installed, and put into research use at the Argonne Tandem/Linac Accelerator System (ATLAS) at Argonne National Laboratory and are being installed at the University of Washington. New high-voltage capability is being installed at the Yale University tandem. A cyclotron using superconducting coils is being built at Texas A&M University using State of Texas funds and private Welch Foundation funds. A powerful, new electron-cyclotron resonance ion source at the Berkeley 88-Inch Cyclotron opens the way for acceleration of an extended range of heavy ion species, and an innovative metal vapor ion source at the Lawrence Berkeley Laboratory's SuperHILAC is providing a dramatic increase in the intensities of the heaviest nuclei. The program maintains a vigorous accelerator R&D effort to ensure that its facilities operate at maximum efficiency and scientific effectiveness.

Continuous Electron Beam Accelerator Facility

The highest priority for new construction in basic nuclear research in the United States is the Continuous Electron Beam Accelerator Facility (CEBAF). The FY 1987 request includes $25,000,000 for initiation of construction plus $6,250,000 in operating expense funds for continuation of supporting research and development. Total estimated cost of CEBAF construction is $236,000,000.

CEBAF will be a new, single-purpose facility for basic nuclear research. Its combination of continuous beam, high intensity, and high energy will be unique in the world. Thus, CEBAF's construction will be an important step in maintaining America's position of leadership in basic nuclear research. It will be operated as a user facility attracting a worldwide community of nuclear scientists. The central instrument of CEBAF will be a high intensity, high duty factor electron accelerator with an energy range of 0.5-4.0 billion electron volts (GeV). The construction project includes an initial complement of experimental equipment and support facilities necessary to perform scientific experiments using CEBAF's high-quality electron and photon beams.

Upon completion of construction, scientists can investigate the ways in which the quarks bound in neutrons and protons influence the makeup and behavior of nuclei, determine how quarks interact while embedded within nuclear matter, and test quantum chromodynamics as the fundamental theory of the strong nuclear force. Experiments in which electrons knock protons or neutrons out of nuclei will yield information about how energy and momentum is distributed among the nucleons (generic name for neutrons and protons) bound inside nuclei and will tell us about correlations among nucleons in nuclei. At the high energy limit of electron scattering, experiments are, to a good approximation, only sensitive to effects of electrons scattering from individual quarks within the nuclei. Under these circumstances, nuclei can be described as a loose collection of free quarks. At energies below 1 GeV, electron scattering from nuclei can accurately be described as electrons scattering from the protons, neutrons, and mesons known to be in nuclei. The energy capability of CEBAF would permit quantitative examination of the transition between these complementary descriptions of nuclei.

The requested $25,000,000 in FY 1987 construction funds is essential for a timely construction project schedule. Specific FY 1987 construction activities will include: (1) acquisition of the Space Radiation Effects Laboratory building site in accordance with Executive Order 12348 and in compliance with regulation 41 CFR Part 101-47; (2) architectural and engineering work; (3) site preparation and utilities including AC power distribution equipment; (4) rehabilitation of existing structures; (5) start of construction on one of the tunnels which will house the linac; (6) engineering and design work on accelerator components, helium refrigerators, and cryogenic systems; and (7) acquisition of initial components of the accelerator. The requested $6,250,000 in operating expenses is necessary for continuation of work to optimize design of CEBAF's cryogenic and helium refrigerator systems, beam extraction systems, accelerator components, and control systems. FY 1987 research and development work will include fabrication and testing of prototypes of critical accelerator and cryogenic subsystems. Also, the FY 1987 R&D effort will include detailed planning for CEBAF's initial complement of research equipment.

Accelerator Facility Operations

The Nuclear Physics program requires the existence and effective operation of large and complex accelerator facilities. These facilities provide the variety of projectile beams upon which virtually all experimental nuclear research depends. Their capabilities determine which experiments can be performed.

Seven accelerator facilities are operated by the Nuclear Physics program as national facilities. These facilities are made available to all the nation's scientists on the basis of scientific merit and technical feasibility of proposals. These national facilities are: the Clinton P. Anderson Meson Physics Facility (LAMPF) at Los Alamos National Laboratory (LANL); the Bates Linear Accelerator Center at Massachusetts Institute of Technology (MIT); the SuperHILAC/Bevalac at Lawrence Berkeley Laboratory (LBL); the Holifield Heavy Ion Research Facility at Oak Ridge National Laboratory (ORNL); the 88-Inch Cyclotron at LBL; the Tandem/Linac Facility at Argonne National Laboratory (ANL); and the Double MP Tandem Van de Graaff facility at Brookhaven National Laboratory (BNL). The off-axis injector at the Stanford Linear Accelerator Center (SLAC) is now operational and serves the nation's scientists on the same basis as a national facility. Upon completion of the Tandem/AGS Heavy Ion Transfer Line construction project, heavy ion beams accelerated by BNL's Alternating Gradient Synchrotron (AGS) will also be available, beginning in FY 1987, on a national facility basis.

In addition to its internal research program, each of the national facilities accommodates major university-based user group research programs. Typically, an outside user group plans experiments, fabricates detectors and other instrumentation at the home institution, executes and partially analyzes experiments at the national facility, and then completes analyses and publication of results at the home institution. Nuclear Physics directly supports 70 university-based user groups who conduct most or all of their research at these national facilities.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations 2. Project No.: 87-R-102

10. Details of Cost Estimate

See description, item 8. The estimated costs are preliminary and, in general, indicate the magnitude of each program. These costs include engineering, design and inspection.

11. Method of Performance

Design will be by contractor staff or on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by firm fixed-price contracts and subcontracts on the basis of competitive bidding.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer. (1)	General Reduction (2)	Management Initiatives (3)	Pay Cost Restoration (4)	FTE General Reduction (5)	Gramm-Rudman-Hollings (6)	ES&H Transfer/ Reprogramming (7)	Subtotal (8)	Comparability Adjustments (9)	Total (10)
Nuclear Physics (ER)										
Medium Energy Nuclear Physics										
Operating Expenses	76,450					-3,259	-60	73,131		73,131
Heavy Ion Nuclear Physics										
Operating Expenses	52,650	-225				-2,235	-40	50,150		50,150
Low Energy Nuclear Physics										
Operating Expenses	13,400	-775				-538		12,087		12,087
Nuclear Theory										
Operating Expenses	9,400					-401		8,999		8,999
Capital Expenses	14,000					-597		13,403		13,403
Construction	7,000					-298		6,702		6,702
Subtotal, Nuclear Physics	172,900	-1,000				-7,328	-100	164,472		164,472
General Reduction:										
Operating Expenses	-1,000	1,000								
Capital Equipment	0	0								
Construction	0	0								
Total, General Reductions	-1,000	1,000								
Management Initiatives:										
Operating Expenses										
Capital Equipment										
Construction										
Total, Managment Initiatives										
Pay Restoration										
Use of Prior Year Balances (NP)										
Operating Expenses										
Capital Equipment										
Construction										
Total, Prior Year Bal. (NP)										

To complement the national facilities, the Nuclear Physics program supports on-campus accelerators at Yale University, Duke University, University of Washington, and Texas A&M University. The Duke Cyclograaff serves a consortium of three universities (Duke University, University of North Carolina of Chapel Hill, and North Carolina State University) called the Triangle Universities Nuclear Laboratory. While each of the on-campus facilities has an important visitor program, these accelerators are operated principally for the research use of the host university's faculty, junior scientists, and graduate students.

In FY 1987, a total of $93,330,000 in operating expenses is requested for operation of accelerator facilities. In FY 1987, the national facilities are expected to have an overall utilization factor of 55%, approximately the same as in FY 1985. Within the FY 1987 accelerator operations total, $1,800,000 is budgeted for 900 beam hours of SLAC injector operations for nuclear research, and $8,670,000 is budgeted for AGS/Tandem facility operations. Also, in the FY 1987 operating expenses request, $71,070,000 is planned for experimental research and $10,500,000 for theoretical research. Within this experimental research total, $260,000 is budgeted for E. O. Lawrence ($60,000) and Enrico Fermi ($200,000) Awards.

Of the total FY 1987 operating expenses request, $44,372,000 is planned as direct support to the university program including university-based users of American and international facilities, accelerator operations and research at on-campus facilities (including MIT Bates), advanced accelerator technology research at MIT, continuation of research and development in support of the CEBAF construction project, and research by university-based theorists.

Additional support to the university program, in an amount comparable to the direct support, is provided through the accelerator centers in the form of services in support of experiments by university scientists and delivery of particle beams to these experiments. The Nuclear Physics program supports numerous research contracts in which there is substantial cost sharing by the universities. The universities' contributions are provided by a number of mechanisms -- for example, salaries to investigators, provision of work space, local machine shop time and labor, computer time, and equipment. The Nuclear Physics program encourages such cost sharing policies to achieve maximum utilization of available Federal funds.

	FY 1985	FY 1986	FY 1987 Request
Medium Energy Nuclear Physics	$ 73,810	$ 73,131	$ 85,000

The Medium Energy Nuclear Physics subprogram supports operations and research at accelerator facilities with sufficient primary beam energy to produce pi mesons (pions) using projectiles no more massive than alpha particles. In addition, the subprogram supports nuclear physics experiments at accelerators operated by other DOE programs (e.g., High Energy Physics and Basic Energy Sciences) and at other unique domestic or foreign facilities.

Two national accelerator facilities are operated entirely under the Medium Energy subprogram--the Clinton P. Anderson Meson Physics Facility (LAMPF) at Los Alamos National Laboratory and the Bates Linear Accelerator Center operated by the Massachusetts Institute of Technology. These accelerator facilities serve an international community of scientists including those from more than 100 American institutions, of which over 90% are universities.

Of the accelerators for which operations support is provided under Medium Energy, the largest nuclear physics program is carried out at LAMPF. The facility is centered around a linear accelerator which is capable of accelerating very intense beams of protons to 800 MeV. A primary role of this facility is to provide intense secondary beams of pions, muons, neutrons, and neutrinos. The ability to provide 10 or more simultaneously operating beams of protons, neutrons, pions, muons, or neutrinos enables LAMPF to be a highly cost-effective basic nuclear research facility. In addition to providing beams for nuclear research, LAMPF provides beams for basic materials research and weapons development at the Weapons Neutron Research (WNR) facility.

The other accelerator facility entirely supported under the Medium Energy subprogram is the Bates accelerator facility. The accelerator is capable of producing electron beams of excellent quality at energies up to 750 MeV. The Bates nuclear research program emphasizes high resolution nuclear structure studies with electrons and studies of the momentum distribution of neutrons and protons moving inside nuclei. Bates is the premier facility in the world for nuclear structure studies involving high resolution electron scattering.

The High Energy Physics electron accelerator at the Stanford Linear Accelerator Center (SLAC) is now also operated on a part-time basis for nuclear physics research using an off-axis source and injector. SLAC operations for nuclear research are supported under the Medium Energy subprogram. In FY 1987, 900 beam hours are planned for nuclear research.

Research activities in medium energy nuclear physics range over an extremely broad selection of topics, including studies of: the fundamental symmetries of nature; distribution of electric charge and magnetic fields inside nuclei; interactions of protons, mesons, and neutrons with nuclei; neutrino oscillations and the neutrino mass; interactions between nucleons; and nuclear structure.

An ultimate goal of all nuclear physics is a complete description of the fundamental particles and forces of nature. Recently, theoretical descriptions of the electromagnetic and weak forces have been unified. This means that these two seemingly disparate interactions have been shown to be different manifestations of the same, basic "electroweak" force. This represents a giant step along the road towards this ultimate goal.

The electroweak interaction actually has three manifestations: the familiar electromagnetic interaction, the charged weak interaction responsible for beta decay, and the neutral weak interaction recently discovered in neutrino scattering. One of the most striking predictions of the "standard model" of the electroweak interaction is that in the elastic scattering of electron-type neutrinos from electrons, the charged and neutral weak interactions will destructively interfere so that the probability of such scattering will be less than that expected if neutral weak interactions were not present. However, prior to a recent LAMPF experiment, the elastic scattering of electron-type neutrinos from electrons had not been observed, mostly because there have been no appropriate sources of these neutrinos. (Note that neutrino-electron elastic scattering is an extremely rare process.) At the LAMPF beam stop (a strong source of electron-type neutrinos), nuclear physicists mounted a large experiment to detect the elastic scattering and measure the interference. The detector is a 15-ton sandwich of scintillation counters and flash chambers specifically designed to detect the recoil electron from elastic scattering and to discriminate against background processes. During the first run of the experiment, 1.6 x 10^{19} neutrinos passed through the apparatus and 20 neutrino-electron elastic scattering events were detected. This number agrees with the standard model prediction with destructive interference. This experiment paves the way for two other major neutrino experiments in preparation at LAMPF. In FY 1987, execution of neutrino experiments will have a high priority within the overall LAMPF research program.

The nuclear force between protons and neutrons (nucleons) in atomic nuclei has long been understood to be dominated by the exchange of bound mesons, with the pi-meson (or pion) being by far the most important in determining the nature of the nuclear force. Pions can also be produced in a free state, and their properties can be directly measured. When a free pion with an energy of a few hundred MeV interacts with a nucleon it often forms a new particle named the delta. The properties of these particles are well described within a theoretical framework of quarks and gluons; the nucleons contain three quarks each and the mesons are composed of quark-antiquark pairs. In this framework, the delta has a particularly simple structure, closely related to that of the nucleon; it consists of three quarks but with a simple rearrangement of quark spins. Introducing a free pion into an atomic nucleus thus can change the quark structure of that nucleus and permit the exploration of quark effects within the many-body nuclear system. Recent work by a collaboration of university and laboratory scientists using LAMPF has provided new information on how introduction of a pion into a nucleus modifies the quark structure of that nucleus. Earlier experiments had indicated that the introduction of the pion into the nuclear medium leads to two possible reaction processes. A free pion may be reemitted, in a process that seems to occur primarily in the outer fringes of the nucleus where a delta is formed on one of the nucleons and subsequently decays back into a nucleon and a pion. Alternatively, the pion may simply disappear, absorbed in the sea of bound pions in the nuclear medium, giving up its mass and energy to nuclear excitation. Such an absorption process also starts with a delta, perhaps in a region of higher nucleon density further inside the nucleus, where the delta interacts with other nucleons and eventually turns back into a nucleon without ever reemitting a free pion. It had been thought for a long time that, in an absorptive interaction, the delta would interact with only one other nucleon with the original energy of the pion eventually shared among only two final nucleons. The recent LAMPF work has shown that, in heavy nuclei, the number of nucleons participating in a pion absorption reaction is typically four. The quark substructure of nucleons is showing itself here, but a full explanation is just beginning to emerge. In FY 1987, investigations of the ways in which pions interact with nuclei and studies of the formation and motion of deltas inside nuclei will continue to be a major theme of LAMPF research.

The users of the facilities of the MIT-Bates Linear Accelerator Center are engaged in a systematic study of nuclear dynamics by exploiting the known properties of the electromagnetic field to probe the detailed behavior of nuclear charges and currents. The electromagnetic field is carried by high energy beams of electrons and photons of high intensity and precision to nuclear targets located in two principal experimental areas. The nuclear interactions are studied by means of a complex of magnetic and other spectrometer systems which detect the scattered electrons and photons and/or the reaction products which include protons, mesons, deuterons, and alpha particles. Systems to detect neutrons are in development. By selecting the energy of the incident beam and the direction, energy, and nature of the detected reaction products, it is possible to answer with great specificity questions about different aspects of nuclear dynamics. The data thus obtained provide the least ambiguous tests of and guidance for the development of nuclear theory. With the upgrade of experimental facilities at Bates, a whole new class of studies has begun. These are broadly distinguished by the detection of a strongly interacting particle in the final state, sometimes with an associated scattered electron. Whereas earlier studies were concerned primarily with the distribution in space of nuclear stationary states, these new programs are designed to study, among other properties, the momentum distribution of nucleons moving inside nuclei. In a study of electron scattering from carbon nuclei, scientists working at Bates have observed significant departures from the expectations of a single nucleon knock-out picture and see evidence for correlated two-nucleon motion.

The best quantitative measurements for testing the theory that protons and neutrons are made up of quarks come from precision scattering experiments carried out with various high energy beams of electrons or muons. Results of these precision scattering experiments have given detailed information about the quarks and their motion inside the proton and neutron. Recently, the European Muon Collaboration (EMC) at CERN used muon beams to bombard nuclei spanning the periodic table from hydrogen to uranium. Researchers observed that the high energy muons scattered differently from the quarks bound inside nuclei than from the quarks in free protons and neutrons. This unexpected observation, called the EMC effect, has been verified with high precision by more recent work at CERN and at the Stanford Linear Accelerator Center. Several different theoretical models have been proposed to explain the EMC effect, such as (1) an increased size of the three-quark bag (nucleon) within the nucleus; (2) the existence of six-quark bags within the nucleus; (3) enhancement of the number of pions within the nucleus; and (4) conventional nuclear structure effects from momentum and binding energy distributions. Since each of these theoretical models can explain the existing electron and muon data, it is important to test with further experiments the differences identified in the various models. A set of complementary nuclear physics studies using medium energy and high energy particles as probes will investigate phenomena arising from the larger variety of configurations available to quarks in heavy nuclei as compared to configurations in individual nucleons.

In FY 1987, $85,000,000 in operating expenses is requested for the Medium Energy Nuclear Physics subprogram. The costs of facility operations at the LAMPF, Bevalac Bates, and SLAC facilities require 62% of the FY 1987 Medium Energy Nuclear Physics request. In addition to supporting the operation of the accelerators themselves, these operations costs also provide for the maintenance and operation of secondary beam lines, major spectrometer systems, and other permanently installed experimental equipment. The remaining 38% of the budget supports costs directly attributable to executing individual experiments, support of participating research scientists, R&D in support of the Continuous Electron Beam Accelerator Facility construction project, and advanced accelerator physics studies. Of the total operating expenses request in FY 1987, $25,285,000 will be for direct support of university research programs, including the Southeastern Universities Research Association (SURA). In addition, much indirect support is provided by the accelerator facilities at which much of this research is performed.

To operate the LAMPF facility in FY 1987, $42,920,000 is required. This total will permit LAMPF to operate 2800 beam hours for research. In addition to these operations costs, $10,900,000 is required for the conduct of research at LAMPF by Los Alamos scientists and by outside user groups, including university groups.

To operate Bates in FY 1987, $6,440,000 is required, and in addition $3,000,000 is required for the conduct of research at Bates by MIT scientists and outside user groups. Operation of the SLAC nuclear physics injector and associated experimental area requires $1,800,000 in FY 1987, with an additional $1,200,000 being budgeted for support of outside groups using the facility. R&D activities by SURA in support of the CEBAF project will require $6,250,000 in FY 1987.

Medium energy nuclear physics research, including the university component, using kaons from a separated secondary beam at the Brookhaven AGS will continue as an important component of this subprogram and will require $3,500,000 in operating expenses in FY 1987. Other Medium Energy activities for FY 1987 include: research at unique foreign facilities; research using polarized, tagged photons at the National Synchrotron Light Source (NSLS); advanced accelerator research and development projects at the National Bureau of Standards, MIT, and LANL; and Fermi Awards. For these research activities, $8,990,000 is requested in FY 1987.

	FY 1985	FY 1986	FY 1987 Request
Heavy Ion Nuclear Physics	$ 49,008	$ 50,150	$ 63,700

The Heavy Ion subprogram supports accelerator facilities and research programs that cover a broad range of topics which are currently expanding our knowledge about the properties of nuclear matter. In combination, these facilities based at national laboratories and major universities provide beams of atomic nuclei ranging in mass from lithium to uranium and in energy from a few MeV to several hundred thousand MeV. In general, each accelerator complex provides beams and experimental facilities for in-house research groups as well as a nationwide community of scientists who travel to the host laboratory to conduct their research. The program makes use of unique properties of heavy ion beams for developing research in such diverse areas as microscopic nuclear properties, macroscopic nuclear interactions, and searches for exotic phases of nuclear matter predicted by theory.

In late FY 1986, the Tandem/AGS Heavy Ion Transfer Line construction project at Brookhaven National Laboratory (BNL) will be completed. In FY 1987, implementation of research programs to study relativistic heavy ion collisions with this new facility in a previously inaccessible energy regime is the highest priority in the Heavy Ion subprogram. The Transfer Line couples the BNL Tandem and Alternating Gradient Synchrotron (AGS) accelerators to provide heavy ion beams up to energies of 14 billion electron volts per atomic mass unit (GeV/AMU) for atomic nuclei up to mass 32 AMU (sulfur). This AGS/Tandem facility will provide beams approximately seven times more energetic than have been previously available anywhere in the world. Research programs in FY 1987 will allow scientists to enter the regime of energy and mass density which could lead to the production of states of nuclear matter which have never before been observed. In FY 1987, the development of detectors and experimental programs at BNL which were begun in FY 1985 will continue. First experiments will be performed during the 1000 hours of beam time planned for FY 1987. Effort will be given to the development of the accelerator complex so that it can provide the variety of beams with characteristics necessary to support the proposed research programs. Both the research and accelerator programs draw heavily on previous experience with heavy ions at lower energies and on experience from High Energy Physics programs. At Lawrence Berkeley Laboratory (LBL) a vigorous research program on heavy ion collisions will continue utilizing beams with masses up to 238 AMU (uranium) and energies up to 2.1 GeV/AMU from the SuperHILAC/Bevalac accelerator complex. The Bevalac remains unique in its capability for providing high energy beams of the heaviest nuclei.

Very active research programs utilizing lower energy heavy ion beams (5-25 MeV/AMU) are supported by complementary facilities at Argonne National Laboratory, Oak Ridge National Laboratory, and Lawrence Berkeley Laboratory (ANL, ORNL, and LBL). At ANL, the new ATLAS facility with its superconducting linac will begin full operation in FY 1986 and provide medium mass heavy ion beams with very precise energy and excellent time profiles for use in a new generation of experiments. The Holifield Heavy Ion Research Facility at ORNL is a state-of-the-art tandem accelerator (designed to achieve 25 million volts on the terminal) coupled with the Oak Ridge Isochronous Cyclotron. The Holifield facility provides precision beams and a wide variety of projectiles. The LBL 88-Inch Cyclotron supplies beams of light to medium mass heavy ions. Its capabilities have been enhanced significantly by the recent addition of an Electron Cyclotron Resonance ion source. This source provides a broad selection of highly charged heavy ion species which can be accelerated to energies appropriate for nuclear studies. This facility is complementary to the tandem facilities because, unlike the ANL and ORNL facilities, the 88-Inch Cyclotron uses positive ions throughout its acceleration cycle. Each of these national laboratory-based accelerators is operated as a national facility. Access to machine time and experimental equipment is open to all qualified scientists on the basis of proposals reviewed for scientific merit and technical feasibility. In addition to the national laboratory accelerators, state-of-the-art facilities are shared with the Low Energy Nuclear Physics subprogram at three universities--Yale University, University of Washington, and Texas A&M University. Each of these accelerators provides a combination of light ion and heavy ion beams, and each of the three university facilities is being upgraded to provide additional research capability. These projects and the research that they will make possible are discussed under Low Energy Nuclear Physics.

The heavy ion beams from these accelerator facilities are used in a wide range of nuclear research programs. At one extreme, heavy ion reactions can produce a broad spectrum of nuclei with precise values of excitation energy and angular momentum for systematic studies of the properties of nuclei near their normal ground states. At another extreme, heavy ion collisions can produce for a brief instant small amounts of nuclear matter at temperatures and densities far from those of normal stable nuclei.

Many forefront spectroscopic studies of nuclear properties concentrate on experiments that measure the shapes of nuclei as their angular momentum and excitation energy are changed. This area is currently undergoing a renaissance as a result of major improvements in capabilities and sophistication of new gamma ray detection facilities. At ORNL, studies of the gamma ray decay of the Giant Quadrupole Resonance has led to new information on the shapes and structure of low-lying excited states in a variety of nuclei. These resonances correspond to a particularly simple class of nuclear excitations which arise from large scale oscillations of the nuclear surface. Precise studies of their decay modes give new insights into the underlying structure of the excited nuclei. Utilizing sophisticated new gamma ray detector arrays, scientists at LBL have been able to extend their studies of the nuclear shape transitions that occur at high spins, thus providing sensitive new tests for nuclear models.

Recent progress at Lawrence Berkeley Laboratory's Bevalac includes the first experimental determination of the compressibility of hot nuclear matter by studying the emission of pions from colliding nuclear systems. LBL scientists also made the first measurement of hydrodynamical flow effects in heavy ion collisions. Recent experiments have used the Plastic Ball detector to detect and measure over one hundred particles simultaneously emitted when nuclei accelerated to high energy collide with nuclei stationary in the laboratory. These programs mark the beginning of quantitative studies to determine the equation of state of hot, dense nuclear matter. Research of this type is essential for providing the overall framework within which experiments at higher energies can be planned and interpreted. Information on the equation of state for nuclear matter provides the input necessary to the theoretical models of stellar evolution leading to supernova explosions and neutron stars.

In FY 1987, the first particle beams with very high energies will become available at Brookhaven National Laboratory. Brookhaven's Tandem/AGS facility will deliver beams of nuclei as massive as sulfur (mass = 32 AMU) and with energies up to 14 GeV AMU. The extreme nuclear conditions created using these beams may yield the first identifiable relaxation of the quark confinement conditions in nuclear matter. The first major heavy ion experiment at the Brookhaven facility is based on a single-arm magnetic spectrometer with high-multiplicity tracking and particle identification. Characteristics of hot dense nuclear matter will be obtained by measurement of effective temperatures and reaction cross sections. A second major experiment involves a Time Projection Chamber mounted in a large volume magnet. This system is designed to measure essentially all charged particles emerging from collisions to look for rare events that would indicate the onset of quark deconfinement.

At energies of tens of billions of electron volts per atomic mass unit and above, heavy ion central collisions may create an entirely new form of matter called a quark-gluon plasma. At sufficiently high temperatures and densities, it is expected that the nucleons which are the normal constituents of nuclei will dissolve into a plasma consisting of their internal substructures, the quarks and gluons. This plasma will then rapidly expand and decay into large numbers of more familiar nuclear constituents--nucleons and mesons. A vigorous theoretical effort is under way to specify the experimental signatures of this state of nuclear matter. These theoretical studies will guide experiments in distinguishing desired events from more prolific background processes. In addition to their value to basic nuclear research, present and planned research on properties of hot, dense nuclear plasmas are becoming increasingly relevant for understanding how our universe behaved in the first instants after the "Big Bang."

At the Super Proton Synchrotron (SPS) at CERN two 17 day running periods are planned with 50 GeV/AMU and 225 GeV/AMU beams of oxygen (16 AMU). Nuclear Physics-supported scientists are leading participants in several CERN experiments which are designed to get a first glimpse of the evidence of a phase transition of nuclear matter to a quark-gluon plasma. These new research efforts involve large collaborations involving university and national laboratory groups from the United States, Europe, and Japan and from both the Nuclear Physics and High Energy Physics communities.

The highest priority effort in FY 1987 in the Heavy Ion Nuclear Physics subprogram will be initiation of heavy ion nuclear research at the AGS. The Heavy Ion operating expenses request includes $8,670,000 for AGS/Tandem facility operations. Of the Heavy Ion total request, $25,680,000 supports research activities; the remaining $38,020,000 request is for facility operations. Also included is $2,000,000 for advanced accelerator R&D at Brookhaven National Laboratory for the heavy ion program. This accelerator R&D program is expected to define the parameters of a facility dedicated to production and examination of the quark-gluon plasma. Of the $25,680,000 request for research funds, $6,525,000 is planned as direct support to universities. Additional university support is provided through the national laboratories in the form of services in support of experiments and provision of beam time.

Of the $38,020,000 requested for accelerator facility operations, $18,540,000 is budgeted for operation of the Bevalac; $8,670,000 is requested for operation of Brookhaven's Tandem/AGS accelerator complex; and $9,315,000 is requested for operation of ATLAS, the 88-Inch Cyclotron, and Holifield. For heavy ion operations at accelerator facilities at Yale University, Texas A&M University, and the University of Washington, $1,495,000 is planned.

The accelerator facilities whose operations are supported by the Heavy Ion subprogram also provide unique capabilities for fundamental research in other fields of physics. Important recent examples include atomic physics studies of one-electron atoms for nuclei as heavy as uranium at the Bevalac and studies of the behavior of highly ionized atoms at low velocities using a novel acceleration-deceleration mode with the two tandems at BNL. Nuclear fragmentation studies at the Bevalac are providing important data for the interpretation of cosmic-ray results. Heavy ion accelerator facilities also have important applications in biomedical research and human cancer therapy. Bevalac heavy ion beams are used to evaluate the effectiveness of heavy ions in destroying human cancer cells while doing minimum damage to intervening healthy cells. This research is supported and managed by the National Cancer Institute and the Department's Nuclear Medicine Applications subprogram in the Biological and Environmental Research programs. (All facility operations costs of the Bevalac, including those for biomedical research, however, are supported by the Nuclear Physics program.)

	FY 1985	FY 1986	FY 1987 Request
Low Energy Nuclear Physics	$ 13,322	$ 12,087	$ 15,700

This subprogram emphasizes experimental investigations of nuclear structure, nuclear decay parameters, and low energy reaction mechanisms. These studies also include general tests of fundamental theories and symmetries, as well as more specific and detailed studies of reactions involved in stellar and cosmologic processes.

University-based research is an important feature of the Low Energy subprogram. In FY 1987, 34% of operating expenses is planned for direct support of university research. FY 1987 marks the initiation of research programs based on major upgrades at each of Nuclear Physics' four dedicated on-campus accelerator facilities. These upgrades include major additions and improvements to the accelerator facilities at the University of Washington and Yale University, a new booster cyclotron at Texas A&M University, and high intensity polarized ion sources at Duke University and the University of Washington.

Nuclear research at the University of Washington will be greatly strengthened when the new superconducting linac booster becomes available in late FY 1987. The booster has been optimized for the acceleration of light ions and heavy ions up to about mass 60 AMU. The new polarized ion source will make possible a wide variety of high precision particle and photon asymmetry measurements for parity violation studies, electromagnetic multipole-mixing determinations, and those polarization measurements which are sensitive probes of nuclear reaction mechanisms. The booster will also make it possible to generate pulsed, monoenergetic neutron beams which can be used to study the E2 isovector giant resonance and other high-lying resonances in a variety of nuclei.

The upgrade of the Yale facility, scheduled for completion in September 1986, will provide an substantial increase in the range of ion energies and masses available for experiments. The anticipated maximum terminal voltage of 22.5 million volts will make it possible to study properties of much heavier nuclear systems with higher excitation energies and more angular momentum. To distinguish more precisely between electric and magnetic transitions in heavier nuclei, a mini-orange-type electron spectrometer is under development for on-line direct detection of conversion electrons. Yale also plans to construct a "silicon box" detector, consisting of a large solid-angle array of semiconductor charged-particle detectors, which will be used to study the excitation spectrum of heavy nuclei by coincidences between gamma rays.

Completion of the construction of a K=500 superconducting cyclotron at Texas A&M University late in 1986 will permit expansion of experimental capabilities there. The new cyclotron, whose construction has been funded by the State of Texas and the private Welch Foundation, will be used alone or as a heavy-ion injector for the existing K=147 cyclotron. The energy range that will be made accessible by coupled operation of the two cyclotrons will provide unique opportunities at Texas A&M. For example, it will permit the production of a high-resolution polarized neutron beam in the 100-160 MeV range that can be used to investigate (n,p) charge exchange reactions and to determine Gamow-Teller matrix elements. They will emphasize nuclei that are candidates for double beta decay which provide sensitive tests of non-zero neutrino masses. These neutron beams will also be used to determine the parameters of neutron-proton scattering in the 80-160 MeV neutron energy region where few reliable measurements exist. The availability of higher energy alpha particle beams, 200-300 MeV, will greatly enhance studies of giant resonances and will permit the creation of rare, unstable nuclides that have not been available for studies heretofore.

The high-intensity polarized ion source at the Duke University accelerator facility will provide an increased intensity that can be used to great advantage in the current experimental program of measurements using polarized protons, deuterons, and polarized neutrons. Polarized neutron experiments, which use secondary beams of neutrons derived from reactions induced by polarized deuterons, will greatly benefit from the more intense beams of deuterons made available by the source. Especially enhanced will be the research using polarized neutrons incident on a cryogenic polarized target. The effects of neutron-nucleus spin-spin forces that are one of the main objects of study are predicted by nuclear theory to be much smaller than the spin-independent forces. Use of the new source should reduce running times for these experiments by a factor of 10. Tests of fundamental symmetries, such as parity conservation and time reversal invariance, are also planned using the polarized target and new polarized ion source.

The conversion of hydrogen to helium by nuclear fusion in the deep interior of the sun is believed to be the primary source of solar energy. Neutrinos are the only particles that escape directly from the solar interior, and thus they provide the only immediate probe of the deep interior of the sun. A unique experiment by Brookhaven scientists, employing a chlorine detector designed to measure the flux of neutrinos from the sun, discovered that the number of neutrino-induced events is about a factor of three lower than one expects from models that correctly reproduce other properties of the sun. This observation implies either that we do not have an adequate understanding of the nature of processes or conditions inside the sun, and hence of stellar processes in general, or that we do not have an adequate understanding of the neutrinos.

An August 1985 report of the NSAC Solar Neutrino subcommittee discussed several alternative experimental approaches for obtaining increased information, including the capture of neutrinos on gallium-71. International collaborative experiments are being formulated to resolve this solar neutrino puzzle.

The low-energy nuclear physics subprogram also supports light-ion research at the LBL 88-Inch Cyclotron, ORNL, and ATLAS. At the 88-Inch Cyclotron, light nuclei far from stability are studied with an on-line mass analysis system. Nuclear scientists are searching for nuclei near the proton and neutron limits of particle stability that may decay by new radioactivities such as beta-delayed two-proton decay. At Oak Ridge, physicists are investigating the mechanisms by which nuclei are excited into giant resonance states and the properties of giant resonance states. At ATLAS, research teams are using proton and other light-ion beams to determine electroweak interaction parameters in nuclei. For example, a high-precision measurement to study the vector-coupling coefficients in 0^+ to 0^+ Fermi decay will be undertaken using the reaction $^{10}B(p,n)^{10}C$.

In FY 1987, $15,700,000 in operating expenses is requested for the Low Energy subprogram. Of this total, $1,500,000 is requested for solar neutrino research and $4,285,000 is budgeted for research and operations at the four dedicated on-campus accelerator facilities to permit them to make productive use of their expanded capabilities. For other university-based research, $1,017,000 is requested. For low energy nuclear research and facility operations at the national laboratories, Small Business Innovation Research, and the Lawrence and Fermi Awards, $8,898,000 is requested in FY 1987.

	FY 1985	FY 1986	FY 1987 Request
Nuclear Theory	$ 9,300	$ 8,999	$ 10,500

Nuclear physics deals with phenomena submicroscopic in origin. It is therefore particularly dependent on theory for the interpretation of experimental results. More importantly, the field is motivated to consider many new exciting experimental possibilities based on the ideas generated and developed by theorists. Questions of how quark substructure of the nucleus might be manifested in experiments at the planned electron machine (CEBAF) or how a phase transition to the quark-gluon plasma would be seen in high energy heavy ion collisions are just two of the exciting new directions.

The Nuclear Theory subprogram is strongly interactive with all three experimental Nuclear Physics subprograms: Medium Energy, Heavy Ion, and Low Energy. Major theory efforts are supported in each of the institutions at which the Nuclear Physics program's national accelerator facilities are sited: Massachusetts Institute of Technology, Argonne National Laboratory, Brookhaven National Laboratory, Los Alamos National Laboratory, Lawrence Berkeley Laboratory, and Oak Ridge National Laboratory.

In addition, a larger number of theoretical nuclear physicists are supported at 28 universities across the nation. In FY 1987, $5,765,000, 55% of the total amount, is budgeted for direct support of university-based nuclear theory programs.

At the heart of much of nuclear theory research is the nuclear many-body problem. Although crucial breakthroughs that allowed the development of a theory of strong interactions occurred three decades ago, only recently have the technical difficulties been sufficiently overcome to allow separation of two-body and three-body effects in nuclear matter calculations. This achievement occurred through years of development of mathematical techniques by theorists, and through the increasing access to supercomputers by the nuclear theory community. In FY 1985 over 1000 hours of supercomputer time was made available at the MFE Computer Center at Livermore by Energy Research's Office of Scientific Computing for nuclear physics research, and more than 2500 hours will be available at Livermore and at SCRI at Florida State University in FY 1986.

Special relativity has been found to play a much more important role in nuclear matter and proton nucleus scattering than previously expected. Recent results in nuclear theory show that, even at low energies, the traditional nonrelativistic nucleon-nucleus potential may be better described in terms of a relativistic theory. Effects of very-short-lived particle-antiparticle pairs are new phenomena predicted by the relativistic theory. These effects are especially important in the calculation of antiprotons as they react with stable nuclei. Another rapidly developing aspect of nuclear-matter theory relates to nuclear astrophysics. Knowledge of the nuclear equation of state, in particular the compressibility of nuclear matter, determines our ability to understand collapsing stars as they consume all of their nuclear fuel. Astrophysical calculations require that nuclei have a "soft" equation of state (very easily compressed) in order to bounce back from a gravitationally driven implosion, creating a shock wave that may lead to a supernova explosion. Results from high energy heavy ion collisions, however, indicate that nuclear matter is very "hard." This disparity leads to a distinct, unresolved scientific dilemma.

Attempts to understand how quarks, gluons, and their interactions determine the makeup and behavior of nuclei will be a central theme of nuclear theory in FY 1987. The basic underlying theory of quarks is known to be quantumchromodynamics (QCD) but the implementation of this theory in the prediction of properties of nuclei is challenging. In all experiments so far, quarks have been found together only in triplets or in quark-antiquark pairs, never alone. The theoretical implication of that experimental result is that quarks are confined and can never be isolated. An outstanding problem of nuclear and high-energy theory is how to generate such a confining force from QCD. Current development of quark models incorporating phenomenological confinement provides physical insight and suggests that a full quark description of nuclei will eventually be obtained. Nuclear theorists bring their particular expertise in many-body physics to the problem of understanding how the behavior of quarks in a nucleus of many nucleons differs from the behavior of quarks in a single neutron or proton.

A recent intriguing result from nuclear theory is that at sufficiently high temperature and pressure a nucleus can change character from being primarily triplets of quarks confined within nucleons into a quark-gluon phase. The entire nucleus becomes, in effect, the confining region, with the quarks released from the individual nucleon to form a "quark-gluon plasma." Such a transition is predicted to occur in nucleus-nucleus (heavy ion) reactions at sufficiently high energy. One problem that is currently challenging theorists is to determine an experimental signature of the phase transition from nuclear matter to a quark-gluon plasma.

In FY 1987, $10,500,000 in operating expenses is required for Nuclear Theory to provide the essential underpinning of theory for the new experimental initiatives discussed earlier in the Medium Energy, Heavy Ion, and Low Energy subprograms. New and basic theoretical developments can point the way to new experiments and complex experimental results must be interpreted and understood in terms of fundamental theory. Development of QCD into a precise, quantitative description of the strong nuclear force, and then into a quantitative description of nuclear interactions and structure is indeed a worthy challenge to nuclear theorists.

	FY 1985	FY 1986	FY 1987 Request
Capital Equipment	$ 12,700	$ 13,403	$ 16,000

Capital equipment funds are needed to provide for instrumentation to improve performance of Nuclear Physics accelerators for particle detection systems, and for data acquisition and analysis systems. These funds are essential for effective utilization of the national accelerator facilities operated by the Nuclear Physics program. In FY 1987, $14,770,000 in programmatic capital equipment funds is required for Nuclear Physics research initiatives and for maintenance of the overall productivity of the Nuclear Physics program. In addition, $1,230,000 is requested for general purpose equipment at Lawrence Berkeley Laboratory (LBL), for which the Nuclear Physics program has laboratory-wide landlord responsibility. Of the $14,770,000 requested for programmatic capital equipment, $4,600,000 is requested for Brookhaven National Laboratory (BNL), primarily in support of heavy ion nuclear research at the AGS; $2,630,000 is requested for Los Alamos National Laboratory (LANL) in support of LAMPF experiments and accelerator operations; and $2,840,000 is planned for experiments and operations at the Lawrence Berkeley Laboratory (Bevalac and 88-Inch Cyclotron). The remaining $4,700,000 is budgeted for the ATLAS facility at Argonne National Laboratory (ANL), the Bates Linear Accelerator Center at the Massachusetts Institute of Technology (MIT), the Holifield Heavy Ion Research Facility at Oak Ridge National Laboratory (ORNL), and Nuclear Physics programs at Duke University and the Stanford Linear Accelerator Center (SLAC).

Nuclear physics research requires carefully prepared beams of protons, neutrons, antiprotons, pions, kaons, muons, photons, electrons, and massive nuclei (such as oxygen, sulfur, iron, gold, and uranium). Detection and interpretation of the results of collisions of these probes with target nuclei requires scientific instrumentation at the limits of present day technology. In addition, the new scientific questions being asked are more discerning and thus require experiments of greater sophistication. An example of this occurs in the field of relativistic heavy ion nuclear physics, where large, fine-grained detector systems must be constructed to confront the complexity of energetic heavy ion reactions in which hundreds of fragments are produced in a single collision.

At Brookhaven National Laboratory, the Tandem/AGS Heavy Ion Transfer Line construction project is creating the opportunity for an exciting experimental program with 14 GeV/AMU beams of heavy ions. Particle beams as massive as sulfur (32 atomic mass units) will be available in late FY 1986 from the Alternating Gradient Synchrotron. Two complementary large experiments have been approved for running. These experiments are designed to provide the first broad look at the physics with 14 GeV/AMU heavy ion beams at the AGS. One of them utilizes a single-arm magnetic spectrometer with high-multiplicity tracking chambers and particle identification detectors. The primary goal is to determine effective temperatures reached in central nucleus-nucleus collisions and to measure particle production cross sections in the forward hemisphere. The funding of this system (Total Estimated Cost = $4,200,000) will be completed in FY 1987. The second major approved experiment utilizes a time projection chamber mounted in the existing Multi-Particle Spectrometer magnet. The objective of this experiment is to measure all charged particles emerging from central collisions of nuclei. Anomalous behavior will be searched for in the observables as an indication of quark deconfinement effects. Completion of funding for this $1,300,000 experimental system is planned for FY 1987.

At Los Alamos National Laboratory, a neutron time-of-flight facility (TEC = $900,000; $550,000 in prior years and $350,000 in FY 1987) and a magnetic spectrometer (TEC = $1,100,000; $500,000 in FY 1986 and $600,000 in FY 1987) are needed as part of an expanded inelastic nucleon-nucleon scattering research program. These improvements will make possible a complete determination of the isospin-zero nucleon-nucleon scattering amplitudes as a function of energy and angle.

At Lawrence Berkeley Laboratory, a large solid-angle detector for the products of energetic heavy ion collisions is needed. The main physics thrust of this detector will be the study of central heavy ion collisions up to the highest Bevalac energies. With this device, the equation of state of nuclear matter can be well studied, since it will be possible to measure simultaneously many interesting hydrodynamic properties of nuclear matter, such as compressibility and thermal conductivity at high pressures and temperatures. A system based on a time projection chamber in conjunction with a time-of-flight array is planned. The device (TEC = $2,100,000; $300,000 in FY 1986 and $1,800,000 in FY 1987) will permit complete event reconstruction, enable the acquisition of data with good statistics since it can operate at high data rates, allow particle identification for protons, pions, kaons, and lambdas, and have good two-particle separation.

At Argonne National Laboratory, the MIT/Bates Linear Accelerator Center, Oak Ridge National Laboratory, and the Stanford Linear Accelerator Center, capital equipment funds are requested for a variety of needs which include high performance gamma-ray detectors, high pressure gas targets, spectrometer magnets and detector systems, the upgrading of computer systems for data acquisition and analysis, and for small equipment items for the operation of the accelerator facilities. Completion of funding for a high-intensity polarized ion source at the Triangle Universities Nuclear Laboratory (Duke University) is planned for FY 1987.

The Nuclear Physics program has responsibility for providing all of Lawrence Berkeley Laboratory's general purpose equipment. For efficient operation of the Laboratory plant and for personnel safety, obsolete equipment must be replaced on a continuing basis. In FY 1987, $1,230,000 is requested for all capital equipment that is required at this laboratory and is not specific to any one program. Examples include: spectrum analyzers and corona detectors for the electronics engineering group, film thickness measuring instruments for the mechanical shops, equipment for Computer-Aided Engineering, radiation detection equipment for LBL's environmental health and safety service groups, a UNIX 16-user work station for the information services group, a precision crane-load positioner for the plant and facilities group, and high-speed nonimpact printer systems for the accounting and financial management group.

	FY 1985	FY 1986	FY 1987 Request
Construction	$ 23,300	$ 6,702	$ 33,300

The total FY 1987 request for construction funds for Nuclear Physics is $33,300,000.

Nuclear Physics
Summary of Construction
(Dollars in Thousands)

Project Title	Project Number	FY 1987 Request	Total Estimated Cost
Continuous Electron Beam Accelerator Facility..................................	87-R-203	$ 25,000	$236,000
Accelerator Improvements and Modifications............................	87-R-201	4,300	4,300
General Plant Projects......................	87-R-202	4,000	4,000
Total..................................		$ 33,300	

Authorization and appropriation are requested to initiate construction of the Continuous Electron Beam Accelerator Facility (CEBAF). Research and development and A/E activities for the CEBAF project are now under way to better define the project's scope, schedule, and total cost. This effort will provide the technical base necessary for initiation of construction on a cost effective schedule in FY 1987. The CEBAF project is the highest priority construction project for basic nuclear research in the United States. CEBAF's unique combination of continuous beam, high intensity, and high energy will provide the opportunity for studying the largely unexplored transition between the nucleon-meson and quark-gluon descriptions of the nuclear force. Accelerator Improvement and General Plant funds are required in FY 1987 in order to meet the demands of frontier nuclear research, to improve efficiency of facility operations, and to maintain high standards of personnel safety.

Continuous Electron Beam Accelerator Facility

In FY 1987, $25,000,000 is requested to start construction of CEBAF. Upon completion CEBAF will feature an electron accelerator complex capable of delivering intense, continuous beams in the energy range from 0.5 to 4.0 billion electron volts (GeV). The intensity, energy range, and continuous nature of CEBAF's beams will make this facility unmatched in the world.

The accelerator complex will consist of: a 1 GeV superconducting linear accelerator (linac) which is split into two 0.5 GeV segments; a beam transport system to guide the electron beams from one segment to the other for up to four complete passes of acceleration through the linac to attain a maximum energy of 4 GeV at a design beam current of 200 microamperes; cryogenic systems and refrigerators to support operation of the superconducting linac; a beam transport system to deliver the continuous beams of electrons from the linac to the experimental halls; and instrumentation and control systems for the accelerator complex. The accelerator will service three independent experimental areas--two buildings for experiments using high intensity electron beams and a smaller area primarily designed for experiments using photon beams.

The conventional construction needed for the facility will include tunnels to house the superconducting linac, beam transport systems, and beam extraction systems; buildings for accelerator operations, cryogenic support systems, helium refrigerator systems, experimental areas, and general office/light laboratory space; beam dumps; and utilities. General office, laboratory, and shop space will also be provided by rehabilitation of existing structures.

In addition to the accelerator complex and buildings to house the research activities, this project will also provide an initial complement of experimental equipment to exploit the capabilities of the accelerator. This equipment includes several large spectrometers, and data acquisition and analysis computers.

FY 1987 activities will include: acquisition of the Space Radiation Effects Laboratory site; rehabilitation of existing structures to provide space for fabrication and testing of prototypes; site preparation and utilities extension; detailed design of accelerator components, helium refrigerators, and cryogenic systems; architectural and engineering work; start of construction on one of the tunnels which will house the linac; and acquisition of long lead components of the accelerator. To avoid delays in later years in installation and testing of accelerator components, these activities should occur in FY 1987.

Accelerator Improvements and Modifications

Accelerator facilities have continuous need during their operating life for small modifications or upgrades to enhance their performance for research use and to improve reliability and efficiency of operation. In FY 1987, a total of $4,300,000 is requested or these activities under Accelerator Improvements and Modifications.

At Argonne National Laboratory, $950,000 is requested for a new positive ion injector for the ATLAS facility. This injector, which uses a new type of superconducting resonator, will provide increased beam current, will improve operating reliability of the facility, and will provide heavier mass heavy ions to begin research in the area of quantum electrodynamics.

At Brookhaven National Laboratory, $500,000 is requested for a new AGS beam line to transport heavy ion beams from the accelerator to experimental stations. This new beam line will have the high vacuum capability and sensitive instrumentation necessary for heavy ion nuclear research.

At the Lawrence Berkeley Laboratory, $1,000,000 is needed for projects at the SuperHILAC/ Bevalac and the 88-Inch Cyclotron. On the SuperHILAC, drift-tube quadrupole magnets will be replaced. These have been damaged from running at the high fields needed to focus very heavy ion beams such as uranium. A second project is an intensity upgrade of the Electron Cyclotron Resonance ion source at the 88-Inch Cyclotron. This will be accomplished by raising the microwave frequency of the source from 6.4 to 14 GHz and increasing the microwave power level.

At Los Alamos National Laboratory, $1,500,000 is requested for LAMPF. Work will include final installation of an optically pumped polarized proton source and improvements of beam lines in the Nuclear Physics Laboratory so that high priority nucleon-nucleon scattering experiments can be conducted with polarized beams.

At the Bates Linear Accelerator Center, $350,000 is budgeted for two projects which are part of the polarized electron beam experimental program: a high voltage supply for the polarized source and a device for on-line measurement of beam polarization in the experimental area.

General Plant Projects

The Construction request includes $4,000,000 for General Plant Projects (GPP) at the Lawrence Berkeley Laboratory, the Bates Linear Accelerator Center at MIT, and the LAMPF facility at Los Alamos National Laboratory. At these laboratories, the Nuclear Physics program has responsibility for GPP funds which provide for minor conventional construction such as building additions and alterations, and other improvements as well as improvements to land and utility systems. A total of $2,600,000 is requested for projects at the Lawrence Berkeley Laboratory, including the replacement of an emergency power system, replacement of roofs on three buildings, building additions for light labs, and major electrical equipment replacement. At the LAMPF facility, $970,000 is planned for additions and improvements to the Nuclear Physics Laboratory for nucleon-nucleon scattering experiments and to the beam stop for weak interaction experiments with neutrinos. At Bates, $430,000 is requested to complete the upgrade of the accelerator cooling system and a microwave link to the MIT campus computers.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
GENERAL SCIENCE AND RESEARCH
NUCLEAR PHYSICS
(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 87-R-201

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 2nd Qtr. FY 1987

4. Date construction ends: 2nd Qtr. FY 1989

5. Previous cost estimate: None
Less amount for PE&D: None
Net cost estimate: None
Date:

6. Current cost estimate: $4,300
Less amount for PE&D: 0
Net cost estimate: $4,300
Date: 5/85

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1987	$ 4,300	$ 4,300	$ 4,300	$ 3,000
1988	0	0	0	1,100
1989	0	0	0	200

8. Brief Physical Description of Project

This project provides for additions, modifications, and improvements to major research accelerators and ancillary experimental facilities. The requested funds are necessary to maintain and improve reliability and efficiency of operations and to provide new experimental capabilities as required for execution of planned research programs.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 87-R-201

8. Brief Physical Description of Project (continued)

Listed below are the laboratories and a description of each subproject:

Argonne National Laboratory (ATLAS).. $ 950

A positive ion injector will be installed at the Argonne Tandem/Linac Accelerator System (ATLAS) facility. The injector will utilize a completely new type of superconducting resonator especially developed to accelerate very-low-velocity ions and will provide 3 million volts of acceleration. An associated cryogenic system and beam line are part of the project.

Brookhaven National Laboratory (AGS/Tandem)... $ 500

This subproject provides for a new AGS beam line for heavy ion experiments. Dipole and quadrupole magnets, vacuum systems, shielding, security gates, and highly sensitive beam instrumentation are included in the project.

Lawrence Berkeley Laboratory (SuperHILAC/Bevalac, 88-Inch Cyclotron)................................ $ 1,000

This subproject provides for the replacement of about one-third of the drift-tube quadrupole magnets in the prestripper section of the SuperHILAC. The new quadrupoles will use a new technology based on rare-earth permanent magnets. These magnets will have 20% greater focusing strength than existing quadrupole magnets.

Also, the Electron Cyclotron Resonance (ECR) source at the 88-Inch Cyclotron will be upgraded by raising its operating frequency from 6.4 GHz to 14 GHz. New solenoid magnets and a new octupole magnet will be constructed and installed; a 14 GHz klystron will be installed.

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 87-R-201

8. Brief Physical Description of Project (continued)

Los Alamos National Laboratory (LAMPF) .... $ 1,500

This subproject provides for the installation of an optically pumped polarized proton source in the Clinton P. Anderson Meson Physics Facility's injector room. This new source has a peak intensity of nearly 100 times that of the existing Lamb-shift source.

Additions and revisions to the permanent proton beam lines in the Nucleon Physics Laboratory are provided for by this project. These include a four-magnet beam swinger system at the time-of-flight facility which will permit variation of the incident angle of the proton beam and a new proton beam line to service the new Medium Resolution Spectrometer.

Massachusetts Institute of Technology (Bates Linear Accelerator Center) .... $ 350

An Isolation Core Transformer is needed to power the new polarized electron source at Bates. Also, for the polarized electron beam program, construction of a Moller spectrometer in Bates' South Hall is planned.

9. Purpose, Justification of Need for, and Scope of Project

Argonne National Laboratory (ATLAS)

The new positive ion injector will increase the beam intensities and provide better operational reliability for almost all ion species now accelerated by ATLAS. The intensity increase will be especially great (100 times) for projectiles such as the calcium isotopes that are difficult to produce with the present tandem injector.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 87-R-201

9. Purpose, Justification of Need for, and Scope of Project (continued)

Brookhaven National Laboratory (AGS/Tandem)

The new AGS beam line will transport heavy ion beams from the accelerator to experiment stations. It will have the high vacuum capability and sensitive instrumentation necessary for heavy ion nuclear research.

Lawrence Berkeley Laboratory (SuperHILAC/Bevalac, 88-Inch Cyclotron)

A major limitation in the ability of the SuperHILAC to transport high mass beams efficiently is the loss rate due to damaged quadrupoles in the prestripper section. The existing drift tube quadrupoles were originally designed to provide the highest field gradients possible with the then-current (1970) technology. Since the addition of the ABLE injector these magnets have been run at the highest possible current levels to transmit the high mass beams (e.g., gold, uranium). This has resulted in an increased failure rate for the aged magnets and reduced transmission through the SuperHILAC for the highest mass beams by about 50%.

The higher RF frequency in the Electron Cyclotron Resonance ion source at the 88-Inch Cyclotron will allow efficient coupling of microwave power to higher density plasmas and is expected to increase the intensity of the very high charge state ions such as Ne10+ and Ar16+. Making higher charge states with sufficient intensity will significantly increase the energies of heavy ion beams from the cyclotron.

Los Alamos National Laboratory (LAMPF)

The optically pumped polarized proton source and improvement of beam lines in the Nucleon Physics Laboratory will provide capability for execution of high priority neutron-proton and proton-proton scattering experiments.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 87-R-201

9. Purpose, Justification of Need for, and Scope of Project (continued)

Massachusetts Institute of Technology (Bates Linear Accelerator Center)

The Isolation Core Transformer now powering the polarized source is on loan and a permanent one is needed. Before coincidence measurements can be performed in the South Hall, it is necessary to be able to determine the beam polarization as it is delivered on target. Use of a Moller spectrometer is a convenient and conventional method for obtaining this information.

Since needs and priorities may change, other subprojects may be substituted for those listed and some of these may be located on non-Government owned land.

10. Details of Cost Estimate

a. Engineering, design, inspection, construction, procurement, component assembly, and installation	$ 4,300
Total Estimated Cost	$ 4,300

11. Method of Performance

Design will be by contractor staff. To the extent feasible, construction and procurement will be accomplished by fixed-price subcontractor awarded on the basis of competitive bidding.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
GENERAL SCIENCE AND RESEARCH
NUCLEAR PHYSICS
(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: General plant projects
various locations

2. Project No. 87-R-212

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3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 2nd Qtr. FY 1987

4. Date construction ends: 2nd Qtr. FY 1989

5. Previous cost estimate: None
Less amount for PE&D: None
Net cost estimate: None
Date:

6. Current cost estimate: $4,000
Less amount for PE&D: 0
Net cost estimate: $4,000
Date: 5/85

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7. Financial Schedule

Fiscal Year	Obligations	Costs FY 1985	FY 1986	FY 1987	After FY 1987
Prior Year Projects	xxx	$ 2,300	$ 100	$ 0	$ 0
1985	$ 3,500	800	1,700	1,000	0
1986	3,352	0	800	1,000	1,552
1987	4,000	0	0	1,000	3,000
		$ 3,100	$ 2,600	$ 3,000	$ 4,552

8. Brief Physical Description of Project

This project provides for minor new construction, other capital alterations and additions, and for improvements to land, buildings, and utility systems. Where applicable, the request also includes the cost of installed capital equipment integral to a subproject. No significant R&D program is anticipated as a prerequisite for design and construction.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects
various locations

2. Project No. 87-R-202

8. Brief Physical Description of Project (continued)

Lawrence Berkeley Laboratory .... $ 2,600

Requirements include: Replacement of the emergency power system in the Building 50 complex; replacement of roofs on Buildings 70A, 77 and 88; extension of the service yard adjacent to Building 77; an addition to Building 74 for light labs; new switching station, feeder cables, and reconfiguration of emergency power switching for the Upper Hill area; and replacement of PCB insulated transformers in Buildings 50A and 50B. The Lawrence Berkeley Laboratory (Berkeley, California) is located on non-Government owned property.

Los Alamos National Laboratory (Clinton P. Anderson Meson Physics Facility)............................ $ 970

This project includes improvements to the LAMPF Nucleon Physics Laboratory to prepare for an expanded experimental program involving the new, high-intensity polarized beam. Specific requirements include: a new floor, additional cooling water and electrical power, added radiation shielding, a counting area to service a new magnetic spectrometer, and a longer flight path and new shielding for the neutron time-of-flight facility. Also, minor additions to and modifications of the main beam stop are needed for conduct of neutrino experiments.

Massachusetts Institute of Technology (Bates Linear Accelerator Center) .... $ 430

Requirements include: Upgrade of the accelerator cooling system by replacement of a deteriorated evaporative cooler and a microwave link between the Bates and the MIT campus computers to permit higher data transmission rates. The Bates Linear Accelerator Center (Middleton, Massachusetts) is located on non-Government owned property.

9. Purpose, Justification of Need for, and Scope of Project

Projects at the Lawrence Berkeley Laboratory, the LAMPF facility at Los Alamos National Laboratory, and at the Bates Linear Accelerator Center at the Massachusetts Institute of Technology are needed to improve efficiency and productivity of these installations and to assure continuation of safe and reliable operations for both personnel and instrumentation.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects various locations

2. Project No. 87-R-202

9. Purpose, Justification of Need for, and Scope of Project (continued)

The distribution of funds requested for FY 1987 is as follows:

Lawrence Berkeley Laboratory	$ 2,600
Los Alamos National Laboratory (Anderson Meson Physics Facility)	970
Massachusetts Institute of Technology (Bates Linear Accelerator Center)	430
Total Estimated Cost	$ 4,000

Since needs and priorities may change, other subprojects may be substituted for those listed and some of these may be located on non-Government owned property.

10. Details of Cost Estimate

See description, item 8. The estimated costs are preliminary and, in general, indicate the magnitude of each program. These costs include engineering, design, and inspection.

11. Method of Performance

Design will be by contractor staff or on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by firm fixed-price contracts and subcontracts on the basis of competitive bidding.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
GENERAL SCIENCE AND RESEARCH
NUCLEAR PHYSICS

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Continuous Electron Beam Accelerator Facility; Newport News, Virginia

2. Project No. 87-R-203

3. Date A-E work initiated: 2nd Qtr. FY 1985

3a. Date Physical Construction Start: 2nd Qtr. FY 1987

4. Date Construction Ends: 2nd Qtr. FY 1992

5. Previous Cost Estimate: None
Less amount for PE&D: None
Net cost estimate: None
Date:

6. Current cost estimate: $236,300
Less amount for PE&D: 300
Net cost estimate: $236,000*
Date: 12/85

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Cost
FY 1987	$236,000	$ 25,000	$ 25,000	$ 14,000
FY 1988	0	65,000	65,000	42,000
FY 1989	0	65,000	65,000	56,000
FY 1990	0	55,000	55,000	58,000
FY 1991	0	26,000	26,000	45,000
FY 1992	0		0	21,000

8. Brief Physical Description of Project

The Continuous Electron Beam Accelerator Facility (CEBAF) is a single purpose, basic nuclear research facility to be located in Newport News, Virginia on a site which includes the land and buildings once occupied by the Space Radiation Effects Laboratory (SREL). Southeastern Universities Research Association (SURA) is expected to be the operating contractor during design, construction, and later operations phases of this project. The site for this facility will be Federally owned.

* Cost estimate based on December 1985 preconceptual design report.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Continuous Electron Beam Accelerator Facility; Newport News, Virginia	2. Project No. 87-R-203

8. Brief Physical Description of Project (continued)

The accelerator facility will include: a 4 billion electron volt (GeV), high intensity, recirculated continuous beam electron linear accelerator (linac); experimental areas and equipment to conduct basic nuclear research; and buildings to house the accelerator complex and its operations and maintenance activities. The facility will possess a complement of equipment for initial experiments and supporting facilities to exploit the capabilities of the accelerator.

a) Improvements to Land and Conventional Construction

Improvements to the site will include such items as drainage, roadways, and the extension of utilities. Support facilities for the accelerator complex will be housed in both new and existing structures. The Virginia Associated Research Center (VARC), an existing single-story structure located on an adjacent site owned by the Commonwealth of Virginia, will provide research and administrative offices. Title to VARC will remain with the Commonwealth of Virginia, which by agreement has made it available to SURA indefinitely for CEBAF use. The Space Radiation Effects Laboratory building, will be renovated to provide shop areas, component test and assembly areas, laboratories, and office space. Support structures include: (1) housing for the linac, recirculator magnets, and beam lines and (2) buildings for the end stations, refrigerator, control center, and accelerator service functions. The SREL buildings and a surrounding 10 acre site will be acquired in accordance with Executive Order 12348 and implementing regulation 41 CFR 101-47.

b) Accelerator System

The central research tool of CEBAF will be an electron linear accelerator. It will consist of a 1 GeV superconducting linear accelerator split into two segments. The segments will be connected by a recirculator system to transport the electron beams from one segment of the linac to the other. Four complete passes of acceleration through the linac will provide an energy of 4 GeV. The accelerator complex will also include a beam extraction system to extract three continuous beams from the linac; a beam transport system to take the three beams to three experimental halls; a cryogenic system including helium refrigerator, liquid helium storage vessels, and distribution lines; and instrumentation and control systems for the accelerator complex.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Continuous Electron Beam Accelerator Facility; Newport News, Virginia	2. Project No. 87-R-203

8. Brief Physical Description of Project (continued)

c) Research Equipment

The accelerator will service three independent experimental areas. Research equipment will include an initial complement of experimental instrumentation and other support facilities necessary to perform scientific research using CEBAF's high quality electron beams and secondary photon beams.

9. Purpose, Justification of Need for, and Scope of Project

CEBAF will be the only facility in the world capable of producing electron beams which simultaneously meet the criteria of high energy, continuous beams, and high intensity necessary to advance the frontiers of electromagnetic nuclear physics. CEBAF has been identified as the highest priority new accelerator for the U.S. nuclear physics program. The unique combination of beam parameters available at CEBAF will make it a facility of unparalleled capability, and the research at CEBAF will enable the U.S. to maintain its preeminence in this important area of nuclear science. CEBAF's electron linac, with its capability of providing intense continuous beams at any energy in the range of 0.5 to 4.0 GeV, is designed to study the largely unexplored transition between the nucleon-meson and the quark-gluon descriptions of nuclear matter. In particular, it will study the extent to which individual nucleons change their size, shape, and quark structure in the nuclear medium, study how nucleons cluster in the nuclear medium, and study the force which binds quarks into nucleons and nuclei at distances where this force is strong and the quark confinement mechanism is important. CEBAF's continuous beam will make it possible to observe one or more of the reaction products in coincidence with the scattered electron, ensuring that these studies can be carried out accurately. The broad spectrum of physics accessible at CEBAF ensures that it will become and remain one of the important scientific centers in the world.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Continuous Electron Beam Accelerator Facility; Newport News, Virginia

2. Project No. 87-R-203

10. Details of Cost Estimate*

		Item Cost	Total Cost
a. Engineering, Design, Inspection, and Administration..........			$ 38,300
1. Conventional Construction at approximately 22% of item b.2		$ 10,800	
2. Technical components at approximately 28% of item b.3 ...		27,500	
b. Construction Costs..			148,900
1. Land and Land Rights (Acquisition of the SREL site)...		1,700	
2. Conventional Construction..............................		49,800	
a. Accelerator facilities..............................	$ 8,600		
b. Experimental facilities.............................	15,300		
c. Support facilities..................................	10,200		
d. Utilities and site preparation.....................	15,700		
3. Technical components..................................		97,400	
a. Accelerator components.............................	67,000		
b. Research equipment.................................	30,400		
c. Standard Equipment..			1,900
			189,100
d. Contingency at approximately 25% of above costs, excluding item b.1			46,900
Total Estimated Cost...........			$236,000

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* Cost estimate based on December 1985 preconceptual design report.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Continuous Electron Beam Accelerator Facility, Newport News, Virginia

2. Project No. [illegible]

11. Method of Performance

Design, construction, and inspection of the facility will be done by the Operating Contractor, subcontracting with an A/E contractor for design and a general contractor for construction of the conventional facilities. To the extent feasible, construction, procurement, and installation will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	Future Years	Total
a. Total project cost								
1. Total facility cost								
a. Construction line item.....	$ 0	$ 0	$ 0	$14,000	$42,000	[illegible]	[illegible]	[illegible]
b. PE&D...........	0	300	0	0	0	0	0	300
Total facility cost.........	$ 0	$ 300	$ 0	$14,000	$42,000	[illegible]	[illegible]	[illegible]
2. Other project costs R&D necessary to complete construction...	[illegible]	[illegible]	$ 4,707	[illegible]	[illegible]	[illegible]	$ 0	[illegible]
Total other project costs..	[illegible]	[illegible]	$ 4,707	[illegible]	[illegible]	[illegible]	$ 0	[illegible]
Total project cost............	[illegible]	[illegible]	$ 4,707	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
GENERAL SCIENCE PROGRAM DIRECTION
GENERAL SCIENCE AND RESEARCH

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
General Science Program Direction					
Operating Expenses...	$ 2,205	$ 2,092	$ 2,092	$ 2,500	$ +408
Total..................	$ 2,205a/	$ 2,092a/b/	$ 2,092	$ 2,500a/	$ +408
Staffing Total FTE's..	37	39	39	39	

a/ Totals reflect a reduction of $5,000 in FY 1985, $15,000 in FY 1986, and $25,000 in FY 1987 for management initiative savings.

b/ Total reduced by $102,000 in accordance with P.L. 99-177, the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm/Rudman/Hollings).

Authorization: Section 209, P.L. 95-91.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
GENERAL SCIENCE PROGRAM DIRECTION

(In thousands of dollars)

1986 Appropriation enacted..	$ 2,194
1986 Gramm-Rudman reduction..	- 102
1986 adjusted..	$ 2,092
Program increases and decreases:	
o Funding required to maintain FTE level	+ 408
1987 budget request..	$ 2,500

General Science Program Direction

The FY 1987 request for General Science Program Direction is $2,500,000. These funds are required to provide for the personnel and other costs associated with continuation of 39 full-time equivalents. These funds support the staff in the Office of the Associate Director for High Energy and Nuclear Physics, the Division of High Energy Physics, the Division of Nuclear Physics, and associated support staff required to administer these programs.

The staff budgeted under this program is responsible for providing effective management, planning and direction to ensure that a viable, high quality national program of basic research and supporting advanced technology R&D is carried out in the fields of high energy physics and nuclear physics. To carry out these responsibilities, the staffs assess the basic research needs in these areas with advice from the appropriate advisory committees, the High Energy Physics Advisory Panel (HEPAP) and the DOE/NSF Nuclear Science Advisory Committee (NSAC). The DOE staff participates actively in both HEPAP and NSAC meetings and special subpanel studies and provides administrative support for their operation. (NOTE: Administrative support responsibility for NSAC is rotated between NSF and DOE; DOE staff has administrative responsibility again in FY 1986 and FY 1987.)

The staff develops and coordinates with appropriate agency and external communities a coherent policy and long-range plan for support of balanced national programs in high energy and nuclear physics; develops budget requests and justification for funding to implement program plans; optimizes the allocation of resources to the laboratories and universities supported by the Department to achieve maximum research productivity, cost effectiveness and efficiency of operation; provides technical oversight for high energy and nuclear physics research programs of 15 major laboratories and about 200 university contractors; and provides technical and project management oversight for three major construction projects.

Effective oversight of high energy and nuclear physics activities requires staff participation in formal annual on-site program reviews of contractors; semiannual on-site reviews of major projects; meetings of laboratory program advisory committees; special facility and research planning meetings; and regional, national, and international research meetings and technical workshops. The staff also participates extensively in international cooperative efforts, which involve the development and management of activities under three formal agreements for cooperation, including participation of U.S. scientists both in experiments at foreign facilities with unique capabilities not available in the U.S. and in conferences and workshops abroad.

The High Energy Physics staff oversees the operation of three large, complex high energy accelerator centers at BNL, Fermilab, and SLAC which are used by qualified physicists from throughout the Nation. The staff will provide technical oversight for the AGS Accumulator/Booster at BNL ($26,400,000 TEC). The upgrade of Fermilab's central computing capability ($23,900,000 TEC), which is essential for effective exploration of Tevatron physics, will continue. Two new world-class facilities, the Tevatron collider at Fermilab and the Stanford Linear Collider at SLAC, will begin their first year of operation for research in FY 1987. The staff will provide technical oversight for the operation of existing facilities and for startup of operation of the new capabilities available from the startup of the Tevatron and SLC. It will provide management oversight for fabrication of two large colliding beam detectors (approximately $40,000,000 each) for more effective utilization of the new Tevatron and SLC research capabilities.

The High Energy Physics staff manages more than 100 university research tasks, and the number is increasing. The staff also oversees an extensive program in advanced technology R&D including activities in support of ongoing construction projects, activities related to enhancing scientific capability and operating effectiveness of existing facilities, and studies of advanced concepts. This includes advanced accelerator R&D for future facilities.

Success of the Nuclear Physics program depends upon effective operation of seven large and complex national accelerator facilities. Nuclear Physics staff will continue to oversee high priority, new research capabilities at BNL (Tandem/AGS Heavy Ion Transfer Line), SLAC (off-axis injector), and ANL (ATLAS Construction Project). The University of Washington and Yale University will begin using the new enhanced capabilities of the University Accelerator Upgrade Project. The HENP staff will also be responsible for managing R&D associated with the Continuous Electron Beam Accelerator Facility, with construction planned to be initiated in FY 1987 at Newport News, Virginia. This project will be built by a consortium of universities unfamiliar with Departmental construction procedures. Staff work will also be required to respond to the large number of inquiries directly related to CEBAF and for briefings of senior staff of Congressional Committees, OMB, and OSTP, as well as members of Congress. In addition the staff must conduct monthly project reviews, review and monitor the actual construction activity, and monitor the design and acquisition of the experimental devices so that they are ready when the facility makes the transition from a construction project to an operating research facility. Nuclear Physics staff will also manage a university-based user program and a theory program to support the CEBAF electron scattering programs and the new heavy ion capabilities at BNL. Workload involving the theory program will include controlling use of time to be made available for theory calculations on a large computer, including review of proposals at LANL and LLNL, and evaluation of the needs of theorists for smaller on-site computers. The Nuclear Physics staff manages more than 100 university research tasks covering a very broad and diverse range of activities. The Nuclear Physics program staff also manages the Nuclear Data activity which is budgeted under Basic Energy Sciences.

In addition to the program-specific activities above, the Office of High Energy and Nuclear Physics is continuing to be impacted by increased emphasis on international collaboration, cooperative programs and formal agreements with foreign countries, which result in heavy workload and travel requirements. This, together with site visits required for day-to-day management activities, advisory committee activities, and other outside conferences and programmatic interfaces, places substantial burdens on the small Federal staff available for managing these large and complex programs. The Department of Energy provides over 90 percent of the Federal support and serves as the Executive Agent for the national High Energy Physics program. Approximately 80 percent of the total Federal support of basic nuclear research is provided through the Nuclear Physics program.

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

URANIUM ENRICHMENT

VOLUME 4

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DEPARTMENT OF ENERGY

Proposed Appropriation Language

Uranium Supply and Enrichment Activities

[For expenses of the Department of Energy in connection with operating expenses; the purchase, construction, and acquisition of plant and capital equipment and other expenses incidental thereto necessary for uranium supply and enrichment activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 34 for replacement only); $1,612,700,000, to remain available until expended: Provided, That revenues received by the Department for the enrichment of uranium and estimated to total $1,612,700,000 in fiscal year 1986, shall be retained and used for the specific purpose of offsetting costs incurred by the Department in providing uranium enrichment service activities as authorized by section 201 of Public Law 95-238, notwithstanding the provisions of section 3302(b) of 31 U.S.C. 484: Provided further, That the sum herein appropriated shall be reduced as uranium enrichment revenues are received during fiscal year 1986 so as to result in a final fiscal year 1986 appropriation estimated at not more than $0.]

As authorized by section 111(h) of Public Law 93-438, as amended, revenues received from the enrichment of uranium shall be credited to this account, to remain available until expended, and to be used for expenses of energy activities in connection with operating expenses, the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for uranium supply and enrichment activities in carrying out the purposes of Public Law 95-91, or successor legislation, including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 33 for replacement only): Provided, That obligations thus incurred may not exceed $1,051,400,000: Provided further, That within these limits, obligations may be incurred in advance of uranium enrichment revenues and shall be liquidated from such collections: Provided further, That of the revenues credited to this account, $235,000,000 shall be transferred to the general fund of the Treasury in partial repayment of Government investment in uranium supply and enrichment activities. (Public Law 99-141, making appropriations for enery and water development, 1986.)

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

URANIUM ENRICHMENT

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1985 Actual	FY 1986 Estimate	FY 1987 Request
Uranium Enrichment Activities	$ 1,644,892	1,546,350	1,291,600
Program Direction	4,000	4,036	4,800
Subtotal, Uranium Enrichment	1,648,892	1,550,386	1,296,400
Revenues	-1,410,936	-1,360,600	-1,296,400
Less Use of Prior Balances and Other Adjustments	---	726	---
Total, Uranium Enrichment	$ 237,956	$ 190,512	$ ---

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW
URANIUM ENRICHMENT

Uranium Enrichment Activities

The goal of the uranium enrichment activities program is to meet commercial and Government requirements for uranium enrichment services in the most economical, reliable, safe, secure, and environmentally acceptable manner possible.

The requested budget for the uranium enrichment activities program is $[illegible]. Through the sale of enriched uranium from existing inventories and rigorous cost reductions, this budget projects payment to the Treasury of $[illegible]. With the expectation of commercial and Defense Program revenues totaling $[illegible], the net uranium enrichment appropriation request for FY 1987 is $0. It reflects the activities believed to be essential to allow the Department to remain competitive with other primary suppliers and thus retain a secure indigenous fuel supply capability to support the nuclear energy option and vital defense requirements in the United States.

The Department presently enriches uranium to the desired uranium-235 (U-235) product assay levels in its gaseous diffusion plants (GDPs) located at Portsmouth, Ohio and Paducah, Kentucky. These plants were built in the 1950s to satisfy defense requirements for highly enriched U-235. They are now operated primarily to provide commercial enrichment services to domestic and non-U.S. utility customers. In these plants, the Department enriches customer-provided natural uranium in the U-235 component for a fee that recovers the cost of providing the services. The Department is the sole producer of enrichment services in the United States. The specific statutory authority that established this role is the Atomic Energy Act of 1954, as amended.

The Department's uranium enrichment objectives are: (1) to be responsive to the needs of the Department's customers for enrichment services; (2) to provide a long-term reliable supply of separative work units (SWU) at predictable prices; (3) to achieve the lowest reasonable price based on sound business practices and utilization of advanced technologies; and (4) to recover costs and to operate the Government's enrichment complex without Federal subsidy.

The Department's strategies to meet these objectives are: (1) to bring supply and demand of DOE-origin enriched uranium into balance; (2) to offer reliable customer services; (3) to offer competitive prices; (4) to capture uncommitted market consistent with financial interests; (5) to minimize the cost of operating existing enrichment plants; (6) to transfer development and ultimate deployment of the Atomic Vapor Laser Isotope Separation (AVLIS) technology to the private sector; and (7) to adopt a more businesslike institutional structure for the future. These strategies are intended to enhance the soundness of the enterprise, and to provide the basis for transforming the program into a more competitive operation.

In the near term, the low operating levels of the GDP complex require power purchases substantially below existing contract levels. Therefore, the Department must pay capacity charges to the power suppliers for power not purchased to the extent that efforts to negotiate reduced contract levels are unsuccessful. In FY 1987 these capacity charges for power not purchased, primarily to the Tennessee Valley Authority, are estimated to be $[illegible], or about [illegible] percent of the budget authority requested for programmatic activities. In FY 1987 the complex will operate at about [illegible] megawatts and produce about [illegible] million SWU. Customer requirements in excess of this amount will be attained from existing inventories.

[illegible]

[illegible]

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CONSTRUCTION PROJECT DATA SHEETS

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1. Title and Location of Project: Continuous Electron Beam Accelerator Facility, Newport News, Virginia

2. Project No. 87-R-203

II. Funding Schedule of Project Funding and Other Related Funding Requirements (continued)

b. Other related funding requirements (FY 1986 dollars)

1. Annual facility operating costs including in-house research	$ 27,000
2. Annual plant and capital equipment costs not related to construction but related to the programmatic effort in the facility	4,300
Total other related annual funding requirements	$ 31,300

III. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project cost

1. Total facility cost

Explained in items 8, 9, and 10

2. Other projects costs

R&D necessary to complete construction

The CEBAF linac will use superconducting radiofrequency accelerating cavity technology to generate high energy continuous electron beams. The R&D funds will be used to design, evaluate, and construct prototypes of the technical components which are essential for meeting the design goals for the facility.

b. Other related funding requirements

1. Annual facility operating costs upon completion of construction

This item includes the cost of all personnel employed by the facility for its operation, maintenance, and in-house research, together with electric power and materials and services costs. Approximately 230 man-years of effort annually will be required.

2. Annual plant and capital equipment costs upon completion of construction

This item includes capital equipment needed to maintain the research capability of the facility to meet evolving research requirements as well as funds for accelerator improvement projects and minor general plant projects required to ensure its continued high performance.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer. (1)	General Reduction (2)	Management Initiatives (3)	Pay Cost Restoration (4)	FTE General Reduction (5)	Gramm-Rudman-Hollings (6)	ES&H Transfer/ Reprogramming (7)	Subtotal (8)	Comparability Adjustments (9)	Total (10)
General Science Program Direction										
Operating Expenses	$ 2,400				$ -206	$ -102		$ 2,092		$ 2,092
Subtotal, General Science Program Direction............	2,400				-206	-102		2,092		2,092
General Reduction										
Management Initiatives										
Pay Restoration										
Use of Prior Year Balances (GSPD)										
Use of Prior Year Balances (Other General Science)										
Total, General Science Program Direction............	$ 2,400				-206	$ -102		$ 2,092		$ 2,092

o Transfer AVLIS to the private sector for further development.

FY 1987 is basically a period during which the restructuring of the uranium enrichment program that began in FY 1986 will be continued. The program changes have required dramatic alterations in our previous approach to research and development, production, and investment in new capacity. Implementation of the changes in the program have been painful, but as the implementation is continued in FY 1987, the enterprise will be in a strong position to compete effectively into the 21st century.

In summary, the principal objective of the uranium enrichment enterprise in FY 1987 is to conduct all activities in a manner that maintains near-term and long-term competitiveness. Competition in the international uranium enrichment marketplace is becoming increasingly more intense, placing increased emphasis on the need to reduce program costs and selling prices. Principal emphasis is being put on lowering prices, minimizing the standby cost for the GDP complex, and on transferring future development of AVLIS to the private sector. Activities in the program will also continue to closeout the GCEP project and the [illegible] program at minimum cost to maintain the GDP located at Oak Ridge, Tennessee in a standby condition.

Payment to Treasury

The Department of Energy is planning to make annual payments to the Treasury for yet unrecovered prior Government investments in the uranium enrichment program. The total unrecovered investment is $[illegible]. The Administration is proposing a writedown of about $[illegible] of this amount—the equivalent of writing off the plant capacity not in use. The remaining $[illegible] will be paid with interest. In FY 1987, $[illegible] in revenue collections will be returned to the Treasury consistent with the annual payment schedule for recovery of the prior Government investment.

Uranium Enrichment Revenues

In response to strong market pressure, including the offering by European competitors of prices [illegible] percent to [illegible] percent less than the United States prices, DOE has adopted a competitive pricing policy. In 1985, the price for commercial Utility Services contract holders was $[illegible] per SWU. In FY 1986, a price reduction to $[illegible] per SWU became effective. In FY 1987, we plan to reduce the price further to $[illegible] per SWU. These prices are demonstrably consistent with the statutory requirement to recover the Government's costs over a reasonable period of time, in accordance with Section 161v of the Atomic Energy Act and with the Uranium Enrichment Services Criteria. In FY 1986 and FY 1987, sales are projected to remain low due to foreign competition and to customer deferral of requirements. Revenues in FY 1986 are estimated to be $[illegible] from the sale of [illegible] million SWU to commercial customers and [illegible] million SWU to Defense Program customers. Revenues in FY 1987 are estimated to be $[illegible] from the sale of [illegible] million SWU to commercial customers and [illegible] million SWU to Defense Program customers.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
NUCLEAR
Uranium Enrichment - Operating Expenses
Uranium Enrichment - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1985 Appropriation	FY 1986 Appropriation 3/	FY 1987 Base	FY 1987 Request	Request vs Base
Uranium Enrichment Activities (UE)					
Gaseous Diffusion					
Operations and Support:					
Operating Expenses ...	$1,050,492 1/	$1,043,063	$1,043,063	$ 977,300	$ -65,763
Capital Equipment	11,800	13,472	13,472	1,000	-12,472
Construction	68,000	18,868	18,868	14,300	-4,568
Subtotal	1,130,292	1,075,403	1,075,403	992,600	-82,803
Atomic Vapor Laser Isotope Separation:					
Operating Expenses ...	78,020	109,664	109,664	50,000	-59,664
Capital Equipment	7,700	18,426	18,426	0	-18,426
Construction	500	2,086	2,086	0	-2,086
Subtotal	86,220	130,176	130,176	50,000	-80,176
Gas Centrifuge Program Closeout Activities:					
Gas Centrifuge Process Development and Demonstration:					
Operating Expenses .	76,000	17,315	17,315	4,000	-13,315
Capital Equipment ..	1,000	0	0	0	0
Construction	0	0	0	0	0
Subtotal	77,000	17,315	17,315	4,000	-13,315
Gas Centrifuge Enrichment Plant:					
Operating Expenses .	39,800	0	0	0	0
Capital Equipment ..	200	0	0	0	0
Construction	310,000	327,457	327,457	0	-327,457
Subtotal	350,000	327,457	327,457	0	-327,457
Subtotal, Gas Centrifuge Program Closeout Activities	427,000	344,772	344,772	4,000	-340,772
Program Direction:					
Operating Expenses ...	4,000 2/	4,536	4,536	4,900	+364
Total					
Operating	1,248,312	1,174,578	1,174,578	1,036,900	-137,678
Capital Equipment	20,700	27,902	27,902	1,000	-26,902
Construction	378,500	348,411	348,411	14,300	-334,111
Total, Uranium Enrichment Activities	$1,647,512	$1,550,891	$1,550,891	$1,052,200	$-498,691
Staffing TOTAL FTE's	66 2/	66 4/	66 4/	67	+1

Authorization: Sec. 33, P.L. [illegible]

1/ Excludes $1,800,000 Appropriation transfer for S.R.I.P. in FY 1985.
2/ Does not reflect the comparability adjustment of 2 FTE transferred to the Department's [illegible] organization.
3/ Adjustments to the FY 1986 Appropriation are shown on the table on the following page.
4/ Excludes 2 FTE transferred to the Department's [illegible] organization.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
URANIUM ENRICHMENT ACTIVITIES
(In thousands of dollars)

FY 1986 Appropriation enacted	$1,550,386
Built in increases and decreases:	
Pay cost supplemental	0
FY 1987 base	$1,550,386
Program increases and decreases:	
Gaseous Diffusion Operations and Support	
o Decrease due to lower power costs and savings from only operating the Paducah, Kentucky and Portsmouth, Ohio gaseous diffusion plants. The Oak Ridge gaseous diffusion plant will be maintained in a standby condition.	-82,403
Atomic Vapor Laser Isotope Separation	
o Decrease due to the use of existing facilities to resolve AVLIS technical issues and a new initiative to transfer the AVLIS technology to the private sector	-76,975
Gas Centrifuge Program Closeout Activities	
o Decrease due to gas centrifuge development and gas centrifuge enrichment plant programs being terminated	-340,372
Program Direction	
o Increase due to salaries, benefits, and travel for Uranium Enrichment staff, located at Headquarters and Oak Ridge offices.	+764
FY 1987 Budget Request	$1,051,400

PROGRAM BUDGET JUSTIFICATION

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Gaseous diffusion operations and support ...	$1,134,892	$1,075,003	$ 992,600

The decrease of $82,403,000 from FY 1986 to FY 1987 is primarily due to lower power costs and savings from only operating the Paducah, Kentucky and Portsmouth, Ohio gaseous diffusion plants (GDPs). The Oak Ridge gaseous diffusion plant will be maintained in a standby condition.

Funding for this activity is required for the operation of the GDPs at Portsmouth, Ohio; and Paducah, Kentucky. Uranium enriched in the fissionable isotope U-235 is produced in these plants to meet utility customer and U.S. Government requirements for nuclear fuel. Funds are included for all of the operating and support requirements for the continued operation of the two diffusion plants and to assure that these plants are maintained in a reliable and safe manner. Funds are included for the purchase of cascade power, diffusion operations, process and long-range technical support, supporting services, change in inventories, and cost of Uranium Enrichment Services Activity (UESA) requirements. In addition, funds are included for necessary capital equipment to support the operational requirements of the plants. The GDP located at Oak Ridge, Tennessee, will continue to be maintained in a standby condition. The Oak Ridge GDP will be maintained in a standby condition with Defense Programs providing the standby funding because of projected Defense demand for enrichment services in the outyears. If the standby funding is not provided, the Oak Ridge GDP will be permanently shut down. If the plant is permanently shut down, it will not be operable because critical components will not be maintained.

The FY 1987 production target of about 7.6 million SWU and the associated power costs were selected following an analysis to minimize the enrichment enterprise costs. In addition, the nonpower operating costs have been reduced to minimize the funding needed to reliably and safely operate and maintain the plants.

This decision unit reflects $-5,000,000 for savings resulting from management initiatives in the area of administrative processes/field structure. Some of these savings will occur in gas centrifuge program closeout activities.

Funds are also requested for capital equipment and for the following new line item construction projects: (1) cooling tower upgrading and (2) General Plant Projects (GPP).

Gaseous diffusion operations and support - operating expenses			
Cascade power	$ 870,300	$ 842,713	$ 829,600
Diffusion operations	151,000	157,450	116,700
Process and long-range technical support ...	16,200	15,200	10,000
Supporting services	16,392	20,600	21,300
Change in inventories	500	1,500	-5,300
Cost of UESA services	4,500	5,600	5,000
Subtotal, operating expenses	1,058,892	1,043,063	977,300

Cascade power	$ 870,300 1/	$ 842,713 2/	$ 829,600 3/

Operation of the GDP's requires large amounts of electric power to pump the process gas uranium hexafluoride (UF_6) through the separating stages. Electric power is obtained

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1/ Includes approximately $347,000,000 for capacity charges for power not purchased under the contracts in effect in FY 1985 with the Tennessee Valley Authority.

2/ Includes approximately $432,000,000 for capacity charges for power not purchased under the contracts expected to be in effect in FY 1986 with the Tennessee Valley Authority.

3/ Includes approximately $454,000,000 for capacity charges for power not purchased under the contracts expected to be in effect in FY 1987 with DOE's three power suppliers.

under long-term contracts from the following suppliers: Tennessee Valley Authority (TVA)--Oak Ridge (in standby) and Paducah; Electric Energy Incorporated (EEInc.)--Paducah; and Ohio Valley Electric Corporation (OVEC)--Portsmouth.

Power from EEInc. and OVEC is obtained from generating stations with a portion or all of the capacities of these stations serving DOE. DOE pays a proportionate share of the total costs incurred by the suppliers for the power it purchases. Power from TVA is purchased from the TVA system at rates patterned after TVA standard industrial rates. TVA can adjust its rates on a quarterly basis to assure meeting bonding and TVA legislative requirements to provide an adequate margin of revenues over costs.

The total power purchased includes cascade power, power used by the Oak Ridge National Laboratory, the Y-12 complex at Oak Ridge, nonprocess users at all gaseous diffusion sites, and line losses. Cascade power is the portion of purchased power that is used to operate the gaseous diffusion process equipment and auxiliaries.

In the short term, the low operating levels of the gaseous diffusion complex require power purchases below existing contract levels. Therefore, the Department must pay capacity charges to its power suppliers for power not purchased to the extent that efforts to negotiate reduced power levels are unsuccessful. DOE has been, and will continue, negotiating with the suppliers in an attempt to reduce or eliminate these capacity charges. To date, these negotiations with the TVA have been unsuccessful and the Department has paid approximately $0.8 billion for power not purchased.

In FY 1987 the enrichment complex will operate at about 2,095 megawatts which is the same as the FY 1986 power level. If FY 1986 or FY 1987 revenue collections drop below current projections, it may be necessary to reduce power purchases in order to maintain the planned payments to Treasury. The contract power that DOE will not be purchasing from the suppliers increases from 4,385 megawatts in FY 1986 to 4,465 megawatts in FY 1987. The budget request for FY 1987 is estimated at $829,600,000. The estimate of capacity charges for power not purchased, which will be paid to TVA ($451,000,000), EEInc. ($1,000,000), and OVEC ($2,000,000), is $454,000,000 or 55 percent of the total power budget request and 43 percent of the total budget request for programmatic activities. Within the requested funding, nonpeak/unfirm power may be purchased subject to the availability of the power and the economics of the separative work produced.

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Diffusion operations	$ 151,000	$ 157,450	$ 116,700

This activity includes all funds needed to operate the GDPs except funds needed for electric power; including wages, employee benefits, supplies and expenses associated with plant operations; the cost of maintenance of equipment, buildings, and facilities used in the production of enriched UF_6; the costs to perform technical and production services such as plant engineering, laboratory studies, decontamination, handling of source and special materials and uranium control; utility services, including water, nitrogen, steam, and dry air; and a pro rata share of essential plant services such as security, health and safety, as well as janitorial, grounds maintenance, safety analysis, environmental and site development studies, and general and administrative expenses.

The decreased funding request in FY 1987 reflects maintaining the Oak Ridge GDP in a standby condition. (Standby costs are included in the supporting services activity.) The funding request in FY 1987 also includes efforts to consolidate and streamline functions, including manpower reductions where required, in order to enhance the overall efficiency of the operation.

Process and long-range technical support ...	$ 16,200	$ 15,200	$ 10,000

The process and long-range technical support activities help to assure the minimum cost operation of the GDP's at the required production levels. The primary activity in FY 1987 will be technical efforts directed toward sustaining plant productivity by minimizing operating problems, adapting to changing conditions and optimizing operations under these changing conditions. A specific example of past success in this area is the development and implementation of compressor modifications which allow more efficient operation at low power levels. In addition, the existing plants will be required to comply with all current and future environmental, health, safety, and other policy or regulation changes. The effective treatment of such problems will be a significant part of the technical support effort.

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Supporting services	$ 16,392 1/	$ 20,600	$ 21,300

The supporting services activity is needed to assure the smooth and efficient operation of the GDPs. The requested funds will be used to maintain gaseous diffusion stages and associated facilities in standby at Portsmouth and Paducah; maintain feed facilities in standby; maintain the Oak Ridge plant in a standby condition; fund inter-plant product flow and other shipments among the gaseous diffusion sites, including the guarding in transit of classified material; fund warehousing of uranium in various forms at the gaseous diffusion sites; fund special management studies, including conceptual design work for needed line-item construction and GPP's planned for future years; funds for engineering and planning studies to support needed capital improvements and to improve operating efficiency; funds for marketing activities, and funds for various production optimization and demand studies, and special study requests. Also included are funds for recovery of diffusion scrap and for the Grand Junction uranium leasing program.

Change in inventories	$ 500	$ 1,500	$ -5,300

The request for Changes in Common-Use Stores and Special Process Spares inventories reflects an effort to reduce the size of the Oak Ridge GDP inventory in light of it being in a standby condition.

Cost of UESA services	$ 4,500	$ 5,600	$ 5,000

These costs are incurred at the Portsmouth plant for withdrawal and analysis of product shipped under commercial toll enriching service contracts, and product shipped to other Federal agencies. Oak Ridge toll facilities may be required for some activities. These costs are matched by miscellaneous revenues received from the customers for these services.

Gaseous diffusion operations and support - capital equipment	$ 11,000	$ 13,472	$ 1,000

These funds are primarily needed to replace equipment at field sites that have exceeded their useful life and to purchase additional equipment needed to meet program objectives in a more effective and efficient manner. Some funds may be needed to purchase headquarters automatic data processing equipment. The decreased funding is primarily related to the Oak Ridge GDP being in a standby condition.

Gaseous diffusion operations and support - construction	$ 65,000	$ 18,468	$ 14,300
Project 87-N-501, General plant projects, various locations (TEC $1,200)	0	0	1,200

This project provides for various items of new construction, additions, alterations, and retirements to the land, buildings, and utility systems at the three GDPs. The GPPs

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1/ Excludes $1,408,000 transferred for S.B.I.R.

are necessary to meet continuing requirements to maintain the facilities in a good state of repair, to adapt the facilities to new or improved production techniques, to effect economics of operation, and to reduce or eliminate health, safety, environment, and security problems.

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Project 87-N-502, Cooling tower upgrading, Paducah, Kentucky (TEC $6,300)	$ 0	$ 0	$ 6,300

This project provides for upgrading three cooling towers at the Paducah, Kentucky, GDP. The cooling tower fill, drift eliminators, and selected structural members will be replaced. The components have deteriorated due to time and use and must be replaced to be able to perform their required function of cooling the process equipment.

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Project 84-N-405, Utilities upgrading, Phase III, Paducah, Kentucky; and Portsmouth, Ohio (TEC $26,916)	$ 12,000	$ 2,116	$ 6,800

This project will upgrade certain utility and auxiliary systems at the GDPs as defined by recent reliability studies. These upgrades will provide the operational reliability required for these vital support systems to sustain normal, safe, and efficient cascade operations. The upgrading includes structure and system work on cooling towers at aducah, Kentucky; and electrical systems at Paducah; Kentucky; and Portsmouth, Ohio.

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Prior year projects	$ 53,000	$ 16,352	$ 0
Atomic vapor laser isotope separation	$ 83,000	$ 126,975	$ 50,000

The decrease of $76,975,000 from FY 1986 to FY 1987 reflects the Department's new initiative to transfer the Atomic Vapor Laser Isotope Separation (AVLIS) technology to the private sector and obtain private sector financial involvement in deployment of AVLIS. Specifically, the involvement of Martin Marietta Energy Systems in the program will be significantly reduced. All near-term activities will be focused on the use of the existing facilities and the resolution of outstanding technical problems.

The long-term goal of the AVLIS program is to develop a technology that will assure the United States enrichment enterprise long-term price competitiveness by producing enriched uranium at a cost significantly less than the marginal production costs for GDPs. The near term policy goal of the AVLIS program is to transfer development and ultimate deployment of the technology to the private sector. The details for determining private sector interest are currently under development.

The near-term technical goal is to focus the experimental program on investigation of those issues documented by the Process Evaluation Board (PEB) in FY 1985 as being technically critical or having high economic leverage. This work will be carried out in existing facilities. Integrated enrichment experiments will be conducted at approximately one-half plant scale at low laser power. This scale will increase confidence in current technical and economic extrapolations prior to proceeding with full-scale demonstration of the process. During FY 1987, the Department will emphasize those research and development activities that add credibility to the performance and cost projections of the technology so that the viability of AVLIS for private sector investment is established. A primary focus will be on separator subsystems where plant prototypical testing will be initiated to understand uranium vapor properties, transport and efficiency. Planned activities in the laser area are to continue component development on higher powered laser systems and increased optical efficiency. The purpose is to increase process performance and reliability, thereby reducing cost.

Atomic vapor laser isotope separation - operating expenses	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Laser demonstration	$ 26,200	$ 26,200	$ 6,300
Uranium separation/processing demonstration	32,400	60,860	28,400
Integration and support	15,200	16,800	9,300
Technology transfer and analysis	1,000	5,800	6,000
Subtotal, operating expenses	$ 74,800	$ 109,660	$ 50,000

Laser demonstration	$ 26,200	$ 26,200	$ 6,300

This category includes such activities as design, test, and evaluation of laser components and hardware that will be used in the Laser Demonstration Facility (LDF). The effort is directed toward improving laser system performance and efficiency and lowering costs for equipment and operations. This category also includes the design, construction, fabrication, and operation of the LDF. During FY 1986, the emphasis will be on achievement of routine operation of the LDF. In FY 1987, emphasis will be placed on demonstrating performance.

Laser Demonstration and Test

The primary laser demonstration and test emphasis in FY 1986 will be to address key technical issues including efforts required to increase the performance and reliability of the LDF to levels necessary for sustained 24-hour/day operations. Copper laser technology efforts include high average power laser development, pulse power technology development, power supply engineering, copper containment, plasma tube/insulation materials and manufacturing methods development, and evaluation of reliability-improvement and cost reductions methods.

During FY 1987, efforts will support the next design iteration of the LDF laser system. Higher power laser systems and improved optical efficiency will also be under development.

The objectives of the program in support of this phase will be to design demonstration equipment that has improved efficiency, reliability, quality, lower costs, and is transferrable to the private sector. These improvements will be made based on the procurement, quality assurance, and operating experiences with current equipment.

Laser Demonstration Facility

In FY 1985, the initial phase, first-of-a-kind laser system was installed and operated to support the FY 1985 process selection. Several areas are being addressed to resolve quality control and engineering problems observed during operation and to complete activation work that was precluded by the compressed demonstration schedule. These areas include copper laser reliability and lifetime, dye laser performance optimization and beam propagation, optical system component sizing and high average power effects, activation of pointing and centering systems and diagnostic packages, and supervisory control system interfaces and access time. This activity will be completed in FY 1986.

The program emphasis in FY 1987 will include continuous operation of the LDF. Continuous 24-hour/day, 7-day/week operation of the LDF lasers results in improved system performance and reliability. The laser operation will emphasize the use of management control systems and operational methods typical of the industrial environment in preparation for increased industrial participation.

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Uranium separation/processing demonstration .	$ 32,400	$ 60,960	$ 29,400

This area of program activity is concerned with all facets of uranium separation and processing in the AVLIS process. This includes: the design, development, and test of components and systems used to separate uranium-235 atoms in a uranium vapor; design, construction, and operation of separator test facilities to test separator components and systems at both sub-scale and full scale; conduct of integrated enrichment tests using laser light supplied from the LDF, currently using the one-half scale MARS separator facility with low laser power but ultimately at full scale with full power; and design, development, and test of processing systems to provide uranium feed to the separator and removal of product and tails.

There are three major separator test facilities in use: 1) the one-half scale MARS facility located at Lawrence Livermore National Laboratory (LLNL), 2) the Separator Demonstration Facility (SDF) at LLNL, designed for full-scale testing when completely outfitted in future years but capable of component testing only at this time, and 3) the Materials Handling Demonstration Module (MHDM) operated by Martin Marietta Energy Systems (MMES) at Oak Ridge, Tennessee.

The primary objectives in this area in FY 1987 include the completion of the one-half scale, low power integrated enrichment test series, and completion of activation and testing of the first generation uranium vaporizer in the SDF.

Separator Demonstration and Test

In FY 1986, efforts will focus on one-half scale integrated enrichment experiments and component development for full-scale systems to address key technical issues. Subscale system tests will concentrate on understanding and improving the performance of the baseline collector design. Methods for thermal control will be tested and a more detailed understanding of factors that degrade product enrichment will be developed.

In FY 1987, the one-half scale integrated enrichment experiments will be completed for the baseline collector and emphasis will be placed on documentation for technology transfer. Engineering design and design verification tests will be conducted for the first full scale separator pod (a pod is the smallest group of components in which uranium separation occurs).

Operation and testing in SDF in FY 1986 will concentrate on activation of the vaporizer and vaporizer subsystems. Comparison between analytical calculations and experimental data will be used to improve process performance models, establish subsequent hardware design changes, and document the experimental data base for the private sector. In FY 1987, extensive testing of the vaporizer will be completed. Information obtained from this phase of operation will include optimum vaporizer operating conditions, throughput efficiency and initial vapor properties. These later results will be documented and transferred to industry.

Operations in MHDM will be halted in FY 1986 and remaining FY 1986 funds will be used for decommissioning and decontamination. Further participation by MMES in the program will be significantly reduced in FY 1987.

Separator Demonstration Facility

Further activities to complete assembly and installation of equipment in the SDF will be limited in FY 1987. Emphasis will be placed on providing facilities necessary to address major technical uncertainties and to complete testing of the vaporizer and vaporizer subsystems. Work to complete assembly and installation of the first full

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Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Confer.	FTE General Reduction	Gramm-Rudman-Hollings	CS&A Transfer/ Reprogramming	Subtotal	Comparability Adjustments	Total
Uranium Enrichment Activities							
Gaseous Diffusion Operations and Support							
Operating Expenses	$1,084,600	$ -	$ -41,287	$ -250	$1,043,063	$ -	$1,043,063
Capital Equipment	14,500	-476	-552	-	13,472	-	13,472
Construction	19,200	-	-732	-	18,468	-	18,468
Subtotal	$1,118,300	$ -	$ -42,571	$ -	$1,075,003	$ -	$1,075,003
Enrichment Research and Development							
Gas Centrifuge Operations & Support							
Operating Expenses	18,000	-	-685	-	17,315	-17,315	-
Atomic Vapor Laser Isotope Separation							
Operating Expenses	114,000	-	-4,340	-	109,660	-109,660	-
Capital Equipment	15,000	-	-571	-	14,429	-14,429	-
Construction	3,000	-	-114	-	2,886	-2,886	-
Subtotal	$ 132,000	$ -	$ -5,025	$ -	$ 126,975	$-126,975	$ -
Subtotal Enrichment Research and Development	$ 150,000	$ -	$ -5,710	$ -	$ 144,290	$-144,290	$ -
Gas Centrifuge Enrichment Plant:							
Gas Centrifuge Operations & Support							
Construction	340,000	-	-12,943	-	327,057	-327,057	-
Atomic Vapor Laser Isotope Separation							
Operating Expenses	-	-	-	-	-	109,660	109,660
Capital Equipment	-	-	-	-	-	14,429	14,429
Construction	-	-	-	-	-	2,886	2,886
Subtotal	$ -	$ -	$ -	$ -	$ -	$ 126,975	$ 126,975
Gas Centrifuge Program Closeout Activities							
Gas Centrifuge Process Development and Demonstration							
Operating Expenses	-	-	-	-	-	17,315	17,315
Gas Centrifuge Enrichment Plant							
Construction	-	-	-	-	-	327,057	327,057
Subtotal, Closeout Activities	$ -	$ -	$ -	$ -	$ -	$ 344,372	$ 344,372
Program Direction:							
Operating Expenses	4,400	-	-167	-	4,233	-197	4,036
Total, Uranium Enrichment Activities	$1,612,700	$ -476	$ -61,391	$ -250	$1,550,583	$ -197	$1,550,386
Operating Expenses	1,221,000	-	-46,479	-250	1,174,271	-197	1,174,074
Capital Equipment	29,500	-476	-1,123	-	27,901	-	27,901
Construction	362,200	-	-13,789	-	348,411	-	348,411

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Supporting Services	$ 37,900	$ 0	$ 0

No additional budget authority is required for this activity; however, costs and outlays will continue to be incurred for termination activities.

Gas centrifuge enrichment plant - capital equipment	$ 200	$ 0	$ 0

No additional budget authority is required for this activity; however, costs and outlays will continue to be incurred for termination activities.

Gas centrifuge enrichment plant - construction	$ 310,000	$ 327,057	$ 0
Project 76-8-g, Enriched uranium production facilities, Portsmouth, Ohio	310,000	327,057	0

No additional funding is requested for this project. Termination was announced by the Secretary of Energy on June 5, 1985. Contracts for equipment, construction, engineering, technical support, and manufacture of centrifuges are expected to be closed out during the FY 1987 budget year. A small number of termination activities may not be completed until FY 1988. The GCEP facility will be retired or transferred to others for alternate use(s) if possible. Contractor employees will be terminated as the above contractors are phased out. To the best of our ability final audits, validation of provisional payments, and final payments on contracts will be made in FY 1987.

Program Direction	$ 4,000	$ 4,036	$ 4,800

The increase of $764,000 from FY 1986 to FY 1987 is required for the Headquarters and field personnel associated with the uranium enrichment program. Funds are included to continue management support in the Office of Uranium Enrichment, and for certain enrichment related work at the Oak Ridge Operations Office. This funding request provides for personal services, personnel benefits, travel, and contractual services and supplies, as follows:

Program Direction
(Tabular Dollars in Thousands)

	FY 1985		FY 1986		FY 1987	
	B/A	Obs	B/A	Obs	B/A	Obs
Personnel Compensation:						
Full-Time Permanent	$	$2,926	$	$3,314	$	$3,218
Other than Full-Time		6		0		0
Other Personnel Compensation		129		10		174
Total Personnel Compensation		3,061		3,324		3,392
Personnel Benefits: Civilian		319		372		381
Benefits for Former Personnel		44		0		0
Travel and Transportation of Persons ...		552		705		710
Other Services (Contractual Services) ..		317		399		317
Total	$4,000	$4,293	$4,036	$4,800	$4,800	$4,800

This decision unit reflects $-49,000 for savings resulting from GS-11 to GS-15 bulge reductions.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
NUCLEAR
Uranium Enrichment - Operating Expenses
Uranium Enrichment - Plant and Capital Equipment

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Payment to Treasury (NE)					
Operating Expenses ..	$	$	$	$	$
Capital Equipment ...					
Construction					
Total	$ 0	$ 0[1]	$ 0[1]	$ 235,000	$+235,000

Authorization: Sec. 16, P.L. 88-489

SUMMARY OF CHANGES

FY 1986 Appropriation enacted	$ 0[1]
Program increases and decreases:	
o FY 1987 payment	+235,000
FY 1987 Budget Request	$ 235,000

PROGRAM BUDGET JUSTIFICATION

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Payment to Treasury	$ 0	$ 0[1]	$ 235,000

The Department of Energy is planning to make annual payments to the Treasury for prior Government investments in the uranium enrichment program. As of the end of FY 1985, the total unrecovered investment is about $7,500,000,000. The Administration is proposing to write down this level of debt to $3,500,000,000. The $4,000,000,000 reduction is the equivalent of eliminating the recovery of unused plant capacity. Interest will be charged each year on the average balance of the reduced Government investment at the rate of 6.3 percent. The rate is weighted average of Treasury borrowing rates existing in the years in which there was a net increase in unrecovered Government investment.

In FY 1987, $235,000,000 in revenue collections will be returned to the Treasury in accordance with the annual payment schedule for recovering prior Government investment.

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[1] Revenues in excess of outlays of approximately $110.000,000 will accrue to the Treasury in FY 1986.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
NUCLEAR
Uranium Enrichment - Operating Expenses
Uranium Enrichment - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Uranium Enrichment Revenues (NE)					
Operating Expenses .	$	$	$	$	$
Capital Equipment ..					
Construction					
Total	$-1,410,936[1]	$-1,360,600	$-1,360,600	$-1,286,400	$ +74,200

Authorization: Sec. 16, P.L. 88-489

SUMMARY OF CHANGES

FY 1986 Appropriation enacted[2]	$-1,360,600
Program increases and decreases:	
o Decrease in commercial revenues	+113,100
o Increase in Government revenues	-38,900
FY 1987 Budget Request	$-1,286,400

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[1] Actual collections.

[2] While the Uranium Supply and Enrichment Activities Appropriation bill estimated revenue collections of $1,612,700,000, the current estimate of revenues that are expected to be collected is $1,360,600,000.

PROGRAM BUDGET JUSTIFICATION

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Uranium enrichment revenues	$-1,410,936	$-1,360,600	$-1,286,400

The estimate for uranium enrichment revenues includes the sale of uranium enrichment services for use in nuclear power reactors for foreign and domestic customers. Also included in this activity are the sale of enrichment services to Defense Programs, advance payments received from customers, and miscellaneous revenues related to uranium enrichment activities as detailed below.

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Request
Sale of uranium enrichment services to commercial customers	$-1,325,136	$-1,221,000	$-1,112,900
Sale of uranium enrichment services to Defense Program customers	-142,800	-169,600	-208,500
Subtotal, sale of uranium enrichment services	-1,467,936	-1,390,600	-1,321,400
Advanced payments on long-term fixed commitment contracts	+67,000	+37,000	+42,000
Subtotal, toll enriching revenues	-1,400,936	-1,353,600	-1,279,400
Miscellaneous revenues	-10,000	-7,000	-7,000
Total, uranium enrichment revenues	$-1,410,936	$-1,360,600	$-1,286,400

Sale of uranium enrichment services	$-1,467,936	$-1,390,600	$-1,321,400

The FY 1987 estimate is based on the sale of 9.4 million commercial SWU sales. In each instance, the toll enrichment customer supplies feed to the Department in the form of UF$_6$ of normal assay and the agency processes the UF$_6$ in the GDPs to the level of enrichment in the U-235 isotope specified by the customer. This revenue estimate is based on a price of $119.00 per SWU to commercial customers. Additionally, 2.1 million SWUs are sold to Defense Program customers at a value of $208,500,000, which is being provided by the Atomic Energy Defense Activities appropriation in DOE. Included in the sale of uranium enrichment services are revenues from the termination charges associated with the cancellation of commercial SWU purchases.

Advanced payments on long-term fixed commitment contracts	$ +67,000	$ +37,000	$ +42,000

The long-term fixed commitment contracts contained provisions for advance customer payments to the Department. These advance payments are credited against future deliveries of toll enriching services. The estimate for FY 1987 reflects the applicable credits against FY 1987 sales of toll enriching services for advance payments made in prior years.

Miscellaneous revenues	$ -10,000	$ -7,000	$ -7,000

Miscellaneous revenues consist of packaging and handling charges, late payment charges, sales from deferred sales contracts, and related items.

This decision unit reflects a $-25,000,000 increase in revenue collections due to improved debt collection operations.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

Uranium Enrichment Revenues	FY 1986 Confer.	FTE General Reduction	Gramm-Rudman-Hollings	ES&H Transfer/ Reprogramming	Subtotal	Comparability Adjustments	Total
Total Revenues	$-1,375,000	-	-	-	$-1,375,000	-	$-1,375,000
Less Impact of GRH on Government Sales	14,400	-	-	-	14,400	-	14,400
Adjusted Revenues	$-1,360,600	-	-	-	$-1,360,600	-	$-1,360,600

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
URANIUM ENRICHMENT - PLANT AND CAPITAL EQUIPMENT
URANIUM ENRICHMENT
URANIUM ENRICHMENT ACTIVITIES

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No. 87-N-501

3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 1st Qtr. FY 1987

4. Date construction ends: 4th Qtr. FY 1989

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 1/86 $ 1,200

7. Financial Schedule:

		Costs			
Fiscal Year	Obligations	FY 1985	FY 1986	FY 1987	After FY 1987
Prior year projects	$ XXXX	$15,443	$12,790	$ 5,600	$23,967
FY 1987	1,200[1/]	0	0	200	1,000

8. Brief Physical Description of Project:

Expenditures for general plant projects to replace, upgrade, and maintain facilities will continue in FY 1987. The age and condition of the plant and continuing concern for the protection of employees, the public, and the environment will affect the levels of general plant projects required. By nature, general plant projects are such that they are not always identifiable on a prospective basis; and even where they are identifiable, there is a brand of uncertainty about physical and financial scope. This project or some of these projects may be located on non-Government owned land. The following pages describe specific projects as representative of the types of work that current needs dictate or that have been shown by experience to be the kinds of miscellaneous construction required to support normal operations.

[1/] This project also requires FY 1987 Authorizations and Appropriations of $1,200,000.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations

2. Project No. 87-N-501

8. Brief Physical Description of Project: (Continued)

This project provides for general plant project capital alterations and additions, such as building and utility systems required for production programs at Paducah, Kentucky; Portsmouth, Ohio; and Oak Ridge, Tennessee. It includes the cost of installed equipment where such is an integral part of general plant projects.

The estimate provides for all general plant projects required for the following:

a. The uranium enrichment plants and supporting facilities at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio.

b. The Oak Ridge, Tennessee administrative projects, including the Federal Building, security facilities, and other direct requirements.

9. Purpose, Justification of Need for, and Scope of Project:

General plant projects are necessary and continuing requirements to maintain the facilities in a satisfactory state of repair, to adapt the facilities to new or improved production techniques, to effect economics of operations, and to reduce or eliminate health, fire, and security problems. Process development and changes in technical program requirements frequently result in the need for alterations or new construction items not previously anticipated. The total project estimate is made up of the anticipated level of work required by each participant. This level takes into account past experience, planned program changes and technological advances.

Estimates by location are as follows:

Oak Ridge Gaseous Diffusion Plant	$ 100
Paducah Gaseous Diffusion Plant	500
Portsmouth Gaseous Diffusion Plant	500
All Other Oak Ridge Operations	100
Total Uranium Enrichment Activities	$ 1,200

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations

2. Project No. 87-N-501

9. Purpose, Justification of Need for, and Scope of Project: (Continued)

Following are examples of general plant projects identified at this date which may be required in FY 1987.

Oak Ridge Gaseous Diffusion Plant .... $ 100,000

Funding is requested for utility, security, environmental or other requirements to place and maintain the Oak Ridge gaseous diffusion plant in a standby condition.

Paducah Gaseous Diffusion Plant .... $ 500,000

Emergency Generator .... $ 200,000

Installation of a 250 KW emergency generator is planned at the water treatment plant to provide emergency power for equipment that operates on 440 volts or less. The existing 150 KW emergency generator is marginal for requirements posed by equipment additions that have been made in recent years at the water treatment facility. The new generator will be installed in a location which is not subject to flooding as is the present generator location.

Technical Services Building .... $ 300,000

Renovation is planned to replace components of mechanical systems that have had extended service life and which need to be maintained to prepare the building for long-term operations.

Portsmouth Gaseous Diffusion Plant .... $ 500,000

Steam Plant .... $ 500,000

Retubing of one 125,000 lb./hour steam boiler is required due to the deteriorated state of existing original tubes. Significant maintenance expense is required annually to permit continued use of the existing tubes, and any further delay in total retubing will jeopardize the supply of steam required for plant operation.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations

2. Project No. 87-N-501

9. Purpose, Justification of Need for, and Scope of Project: (Continued)

All Other, Oak Ridge Operations..	$ 100,000

Miscellaneous other projects are mainly for improvements to the Security Department, Patrol Range, Motor Pool, Security Operations Center, and the Computer Facility.

10. Details of Cost Estimate:

Cost estimate details have not been developed. Such detailed estimates are made in connection with each individual project request after specific need and scope have been established and after completion of preliminary engineering.

11. Method of Performance:

Design and inspection will be performed by the operating contractor. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded to the lowest bidder.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

No narrative required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

No narrative required.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
URANIUM ENRICHMENT - PLANT AND CAPITAL EQUIPMENT
URANIUM ENRICHMENT
URANIUM ENRICHMENT ACTIVITIES

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Cooling tower upgrading
Paducah, Kentucky, Gaseous Diffusion Plant

2. Project No. 87-N-502

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3. Date A-E work initiated: 1st Qtr. FY 1987

3a. Date physical construction starts: 1st Qtr. FY 1988

4. Date construction ends: 4th Qtr. FY 1990

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 1/86 $ 6,300

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1987	$ 6,300	$ 6,300	$ 6,300	$ 200
1988	0	0	0	1,600
1989	0	0	0	3,500
1990	0	0	0	1,000

8. Brief Physical Description of Project:

This project provides for upgrading three of the cooling towers at the Paducah, Kentucky, Gaseous Diffusion Plant. The cooling towers, which remove process heat from the diffusion cascade, will be upgraded by replacement of fill, drift eliminators, and selected structural members.

9. Purpose, Justification of Need for, and Scope of Project:

The cooling towers proposed to be upgraded in this project are necessary support systems to assure continued operation of the diffusion cascade. A reliability study and an inspection report substantiate the need for cooling tower fill replacement and structural upgrading in this timeframe. These components have deteriorated due to time and use and must be replaced in order to be able to perform their required function of cooling the process equipment.

1. Title and location of project: Cooling tower upgrading
Paducah, Kentucky, Gaseous Diffusion Plant

2. Project No. 87-N-502

9. Purpose, Justification of Need for, and Scope of Project: (Continued)

Delay in implementation of this project will increase the risk to plant operations from continued deterioration of these systems.

No increase in operating costs will result from implementation of this project. Operating costs of these systems should reduce due to the lower costs to maintain the cooling towers.

10. Details of Cost Estimate:*

	Paducah
a. Engineering, design and inspection at approximately 17% of construction costs, Item b.	$ 770
b. Construction costs	
(1) Improvements to land	0
(2) Building	0
(3) Other structures	4,495
(4) Special facilities	0
Subtotal	5,265
c. Contingency at approximately 20% of above costs	1,035
Total project costs	$ 6,300

11. Method of Performance:

Title I and II design will be performed under a negotiated Architect-Engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price subcontract(s) awarded on the basis of competitive bidding. A-E support activities, Title III inspections, and subcontract administration will be performed by the operating contractor.

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*Based on conceptual design completed March 1985.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Cooling tower upgrading
Paducah, Kentucky, Gaseous Diffusion Plant

2. Project No. 87-N-502

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project costs						
1. Total facility costs						
(a) Construction line item.......	$ 0	$ 200	$ 1,600	$ 3,500	$ 1,000	$ 6,300
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs	0	200	1,600	3,500	1,000	6,300
2. Other project costs						
(a) R&D necessary to complete construction	0	0	0	0	0	0
(b) Conceptual design costs......	93	0	0	0	0	93
(c) Other project related costs .	0	0	0	0	0	0
Total other project costs ...	93	0	0	0	0	93
Total project costs	$ 93	$ 200	$ 1,600	$ 3,500	$ 1,000	$ 6,393

b. Other related annual costs	
1. Facility operating costs	$ 0
2. Programmatic operating expense directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction not related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual costs	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
   1. Total facility costs. No narrative required.
   2. Other project costs. No narrative required.

b. Other related annual costs
   1. Facility operating costs are expected to be reduced due to improved operational efficiency and reduced maintenance costs. No additional operating personnel will be required.
   2 thru 5. No narrative required.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
CONSTRUCTION PROJECT DATA SHEETS
URANIUM ENRICHMENT - PLANT AND CAPITAL EQUIPMENT
URANIUM ENRICHMENT
URANIUM ENRICHMENT ACTIVITIES

(Tabular dollars in thousands. Narrative material in whole dollars.)

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1. Title and location of project: Utilities upgrading, Phase III, Paducah, Kentucky and Portsmouth, Ohio

2. Project No. 84-N-405

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3. Date A-E work initiated: 1st Qtr. FY 1984

3a. Date physical construction starts: 3rd Qtr. FY 1984

4. Date construction ends: 1st Qtr. FY 1991

5. Previous cost estimate: Date: 12/84 $ 27,000

6. Current cost estimate: Date: 1/86 $ 26,916

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7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1984	$ 6,000	$ 6,000	$ 5,000	$ 676
1985	12,000	12,000	13,000	3,832
1986	2,116 1/	2,116 1/	2,116 1/	1,740
1987	6,800	6,800	6,800	1,200
1988	0	0	0	2,700
1989	0	0	0	7,000
1990	0	0	0	5,600
1991	0	0	0	4,168

8. Brief Physical Description of Project:

This project provides for upgrading selected utility and auxiliary systems at the gaseous diffusion plants at Paducah, Kentucky and Portsmouth, Ohio, as defined by recent reliability studies. This work will encompass at Paducah, the restoration and replacement of selected structure, piping, fill and cable on a variety of cooling towers and replacement of the 480 volt fan switchgear in all four pumphouses and at Portsmouth, the replacement of 480 volt process auxiliary substation breakers in the X-326 and X-330 Process Buildings and additional facilities for impoundment of sludge generated in the water treatment plant. In addition, this project provides for upgrading the Paducah facility to permit withdrawal of higher assay material.

1/ Excludes $84,000 sequestered by the Balanced Budget and Emergency Deficit Control Act of 1985, Public Law 9-177.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Utilities upgrading, Phase III, Paducah, Kentucky and Portsmouth, Ohio

2. Project No. 84-N-405

9. Purpose, Justification of Need for, and Scope of Project:

The purpose of this project is to renovate, upgrade, or replace utility systems or components vital to the continued reliable operation of the diffusion cascade and support buildings. Equipment that has become worn out, obsolete, and unreliable is to be upgraded as necessary to improve the safety, reliability, and efficiency of plant operations for the long-term future.

Components of the cooling towers at Paducah have exceeded their expected life and have deteriorated with usage. The structures are still in serviceable condition, but the fill material in some of the towers (the section where the heat transfer occurs) is disintegrating. The upper decks are also deteriorating and becoming hazardous. The water distribution systems on top of the towers have extensive internal corrosion and scaling of the piping and deterioration of the wood that degrades the water distribution and cooling efficiency of the entire tower. These components must be replaced. The conduit and cable serving the cooling tower fans has deteriorated beyond repair and must be replaced in order to withstand the severe environmental conditions.

The electrical switchgear serving the critical auxiliary equipment in the process buildings at Portsmouth and the cooling tower fans on all of the cooling towers at Paducah have deteriorated with age and usage. The manufacturers of this equipment have either ceased manufacturing these components or have gone out of business entirely and replacement parts are very difficult to obtain. Parts must be custom made or substitutions found. It is now necessary to renovate this switchgear on a programmed basis in order to restore the necessary reliability for continued operation and personnel safety.

At Portsmouth the treatment of water for plant use produces a sludge that must be disposed of in an acceptable manner. The existing lagoon will continue to receive this sludge; however, current projections indicate that the present capacity will be filled by the early 1990's. Although the present lagoon complies with all current environmental regulations for disposal, expansion is required to meet future operational requirements.

With the Oak Ridge plant in a standby condition, only the Portsmouth plant is capable of producing enriched uranium with an assay above 2 percent. To meet customer requirements (delivery/shipment dates), it is necessary to upgrade the Paducah plant to be capable of withdrawing material with an assay above 2 percent. Modifications will be made to certain cascade equipment and decontamination systems to provide critically safe geometrics to meet the higher assay requirements. A plant wide criticality alarm system is required and will be provided with this added scope of work.

The FY 1987 obligational authority of $6,800,000 will provide for completion of the project.

A delay in the implementation of the project will result in continued deterioration of these critical systems and increase the risk, perhaps significantly, of serious operational interruptions to the cascades.

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Geothermal Resources Development Plan

For carrying out the Loan Guarantee and Interest Assistance Program as authorized by the Geothermal Energy Research, Development and Demonstration Act of 1974, as amended, $72,000, to remain available until expended: Provided, That the indebtedness guaranteed or committed to be guaranteed through funds provided by this or any other appropriation Act shall not exceed the aggregate of $500,000,000. (Public Law 99-141, making appropriations for energy and water development, 1986.)

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
GEOTHERMAL RESOURCES DEVELOPMENT FUND

(Tabular dollars in thousands. Narrative material in whole dollars)

Geothermal Resources	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Development Fund (CE)					
Program Direction					
Operating Expenses	$ 121	$ 69	$ 69	$ 72	+$ 3
Total	$ 121	$ 69	$ 69	$ 72	+$ 3
Staffing	1	1	1	1	0

Authorization: P.L. 93-410, Geothermal Energy Research Development ard Demonstration Act of 1974, Title II
P.L. 95-238, Department of Energy Act of 1978 - Civilian Applications, Title V
P.L. 96-294, Energy Security Act, Title VI

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
GEOTHERMAL RESOURCES DEVELOPMENT FUND
SUMMARY OF CHANGES

(Dollars in Thousands)

FY 1986 Appropriation adjusted..	$ 69
Program increases and decreases:	+$ 3
FY 1987 Budget Request..	$ 72

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
GEOTHERMAL RESOURCES DEVELOPMENT FUND NARRATIVE

The goal of the Geothermal Loan Guaranty Program is to encourage the commercial production of energy from geothermal resources by guarantying lenders against loss of principal and interest on loans made to qualified borrowers for geothermal projects. Further, the program strives to develop normal borrower-lender relationships which will provide financing of geothermal projects without direct Federal sharing of the risk.

	FY 1986 Adjusted Approp.	FY 1987 Request	Net Change
Geothermal Resources Development Fund....	$ 69,000	$ 72,000	+$ 3,000

The FY 1987 Budget Request includes funds for program direction. These funds will support one person who will provide overall program guidance and direction for the multi-million dollar Geothermal Loan Guaranty Program. This person will also evaluate and monitor current loan guaranties which have either been issued or are pending issuance.

The FY 1987 Budget Request for the Geothermal Resources Development Fund is $72,000. The represents an increase of $3,000 from the adjusted FY 1986 appropriation.

DOE/MA-0084/4
Volume 5 of 7

Congressional Budget Request

Power Marketing Administrations
Departmental Administration

Volume 5

FY 1987

U.S. Department of Energy
Assistant Secretary,
Management and Administration
Office of the Controller
Washington, D.C. 20585
February 1986

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Utilities upgrading, Phase III, Paducah, Kentucky and Portsmouth, Ohio

2. Project No. 84-N-405

10. Details of Cost Estimate:

	Paducah	Portsmouth	Total
a. Engineering, design and inspection at approximately 14% of construction costs, Item b.	$ 2,200	$ 700	$ 2,900
b. Construction costs	13,300	6,300	19,600
(1) Other structures	9,500	0	9,500
(2) Special facilities	3,500	6,300	9,800
(3) Standard equipment	300	0	300
Subtotal	15,500	7,000	22,500
c. Contingency at approximately 20% of above costs	3,816	600	4,416
Total estimated costs	$19,316	$ 7,600	$26,916

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract except that some switch-gear replacements will be done by the operating contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price contract(s) and subcontracts(s) awarded on the basis of competitive bidding. Long delivery and special procurements will be accomplished by the operating contractors as will tie-ins and work on operating equipment.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	Total
a. Total project costs										
1. Total facility costs										
(a) Construction line item	$ 0	$ 676	$3,832	$1,740	$1,200	$2,700	$7,000	$5,600	$4,168	$26,916
(b) PE&D	0	0	0	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0	0	0	0
Total facility costs	0	676	3,832	1,740	1,200	2,700	7,000	5,600	4,168	26,916
2. Other project costs										
(a) R&D necessary to complete construction	0	0	0	0	0	0	0	0	0	0
(b) Conceptual design costs	351	0	198	0	0	0	0	0	0	549
(c) Other project related costs	0	0	0	0	0	0	0	0	0	0
Total other project costs	351	0	198	0	0	0	0	0	0	549
Total project costs	$ 351	$ 676	$4,030	$1,740	$1,200	$2,700	$7,000	$5,600	$4,168	$27,465

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Utilities upgrading, Phase III, Paducah, Kentucky and Portsmouth, Ohio

2. Project No. 84-N-405

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (Continued)

b. Other related annual costs (estimated life of project facilities: 15 years)

1. Facility operating costs	$ 0
2. Programmatic operating expense directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. Maintenance, repair, GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual costs	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total project costs
   1. Total facility costs. No narrative required.
   2. Other project costs
      (a) No narrative required.
      (b) The majority of conceptual design was completed prior to FY 1984 at a cost of $351,000. Additional conceptual design was undertaken in FY 1985 associated with the additional criticality work at Paducah, at a cost of $198,000.
      (c) No narrative required.

b. Other related annual costs
   1. Facility operating costs are expected to be reduced due to decreased maintenance. No additional operating personnel will be required.
   2 thru 5. No narrative required.

Department of Energy
FY 1987 Congressional Budget Request
Adjustments to FY 1986 Appropriations

	FY 1986 Conference	Gramm-Rudman-Hollings Reduction	Adj. Approp. Total
Geothermal Resources Development Fund (CE)			
Program Direction			
Operating Expenses	$ 72	$ -3	$ 69
Total, Geothermal Resources Development Fund	$ 72	$ -3	$ 69

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

DEPARTMENTAL ADMINISTRATION

VOLUME 5

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DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1985 Actual BA	FY 1986 Estimate BA	FY 1987 Request BA
Appropriations Before The Energy and Water Development Subcommittees:			
Energy Supply Research and Development	1,967,490	1,696,298	1,254,162
Uranium Enrichment	237,956	190,512	---
General Science and Research	724,860	655,928	773,400
Atomic Energy Defense Activities ..	7,322,321	7,231,664	8,230,000
Departmental Administration	128,602	150,319	151,082
Alaska Power Administration	3,233	3,245	2,881
Bonneville Power Administration ...	284,771	330,000	276,100
Southeastern Power Administration .	35,744	---	19,647
Southwestern Power Administration .	31,208	29,191	25,337
Western Area Power Administration .	218,230	195,910	240,309
Western Area Power Emergency Fund .	---	---	---
Federal Energy Regulatory Commission	54,543	41,989	20,325
Nuclear Waste Fund	327,669	499,037	769,349
Geothermal Resources Development Fund	121	69	72
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	$11,336,748	$11,024,162	$11,762,664

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

(in thousands of dollars)

	FY 1985 Actual BA	FY 1986 Estimate BA	FY 1987 Request BA
Appropriations Before Interior and Related Agencies Subcommittees:			
Alternative Fuels Production	$ 1,169,895	$ ---	$ ---
Clean Coal Technology	---	---	---
Fossil Energy Research and Development	289,048	311,954	82,767
Naval Petroleum and Oil Shale Reserves	156,874	13,002	127,108
Energy Conservation	457,436	427,512	39,433
Energy Regulation	27,139	23,423	21,850
Emergency Preparedness	6,045	5,750	6,044
Strategic Petroleum Reserve	2,049,550	107,533	---
Energy Information Activities	60,919	57,724	59,651
Subtotal, Interior and Related Agencies Subcommittees	4,216,906	946,898	336,853
Subtotal, Energy and Water Development Subcommittees	11,336,748	11,024,162	11,762,664
Subtotal, Department of Energy	15,553,654	11,971,060	12,099,517
Permanent - Indefinite Appropriations:			
Payments to States	1,052	570	570
Total, Department of Energy	$15,554,706	$11,971,630	$12,100,087

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
ENERGY & WATER SUBCOMMITTEE				
HEADQUARTERS	4,865	4,965	-18	4,947
FIELD	9,133	9,185	111	9,296
SUBCOMMITTEE TOTAL	13,998	14,150	93	14,243
INTERIOR SUBCOMMITTEE				
HEADQUARTERS	1,353	1,304	-166	1,138
FIELD	907	896	-226	670
SUBCOMMITTEE TOTAL	2,260	2,200	-392	1,808
GRAND TOTAL	16,258	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,258	16,218	-497	15,721

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1985 FTE USAGE	FY1986 CONGR REQ	FY1987 -FY86	FY1987 CONGR REQ
10:ENERGY SUPPLY RESEARCH AND DEV	937	934	-34	900
HEADQUARTERS	811	820	-28	792
FIELD	126	114	-6	108
15:URANIUM ENRICHMENT	69	66	1	67
HEADQUARTERS	58	55	1	56
FIELD	11	11	0	11
20:GENERAL SCIENCE AND RESEARCH	37	39	0	39
HEADQUARTERS	37	39	0	39
25:ATOMIC ENERGY DEFENSE ACTIVITI	2,618	2,702	131	2,833
HEADQUARTERS	496	518	9	527
FIELD	2,122	2,184	122	2,306
30:DEPARTMENTAL ADMINISTRATION	3,307	3,332	-5	3,327
HEADQUARTERS	1,721	1,726	0	1,726
FIELD	1,586	1,606	-5	1,601
34:ALASKA POWER ADMINISTRATION	37	38	0	38
FIELD	37	38	0	38
36:BONNEVILLE POWER ADMIN	3,510	3,480	0	3,480
FIELD	3,510	3,480	0	3,480
38:SOUTHEASTERN POWER ADMIN	38	40	0	40
FIELD	38	40	0	40
42:SOUTHWESTERN POWER ADMIN	186	186	0	186
FIELD	186	186	0	186
46:WESTERN AREA POWER ADMIN	1,181	1,160	0	1,160
FIELD	1,181	1,160	0	1,160
50:WAPA - COLORADO RIVER BASIN	219	219	0	219
FIELD	219	219	0	219
52:FEDERAL ENERGY REGULATORY COMM	1,617	1,659	0	1,639
HEADQUARTERS	1,617	1,659	0	1,659
54:NUCLEAR WASTE FUND	238	292	0	292
HEADQUARTERS	123	147	0	147
FIELD	115	145	0	145
56:GEOTHERMAL RESOURCES DEV FUND	2	1	0	1
HEADQUARTERS	2	1	0	1
65:FOSSIL ENERGY RESEARCH AND DEV	714	700	-161	539
HEADQUARTERS	151	135	-26	109
FIELD	563	565	-135	430
70:NAVAL PETROL & OIL SHALE RES	104	104	-9	95
HEADQUARTERS	23	23	0	23
FIELD	81	81	-9	72
75:ENERGY CONSERVATION	333	352	-134	218
HEADQUARTERS	208	227	-79	148
FIELD	125	125	-55	70
80:EMERGENCY PREPAREDNESS	74	71	0	71
HEADQUARTERS	74	71	0	71
81:ECONOMIC REGULATION	377	340	-50	290
HEADQUARTERS	377	340	-50	290
85:STRATEGIC PETROLEUM RESERVE	178	152	-32	120
HEADQUARTERS	40	27	-5	22
FIELD	138	125	-27	98
90:ENERGY INFORMATION ACTIVITIES	480	481	-6	475
HEADQUARTERS	480	481	-6	475
94:ADVANCES FOR CO-OP WORK	2	2	0	2
FIELD	2	2	0	2
GRAND TOTAL	16,258	16,350	-299	16,051
ADJUSTMENT		-132	-198	-330
ADJUSTED TOTAL	16,258	16,218	-497	15,721

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

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DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

POWER MARKETING ADMINISTRATIONS

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1985 Actual	FY 1986 Estimate	FY 1987 Request
Alaska	$ 3,233	$ 3,245	$ 2,881
Bonneville	284,771	330,000	276,100
Southeastern	35,744	---	19,647
Southwestern	31,208	29,191	25,337
Western	218,230	195,910	240,309
Western Emergency Fund	---	---	---
Total, Power Marketing Administrations	$573,186	$558,346	$564,274

DEPARTMENT OF ENERGY
FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST
POWER MARKETING ADMINISTRATIONS
ALASKA POWER ADMINISTRATION
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DEPARTMENT OF ENERGY

Proposed Appropriation Language

Operation and Maintenance, Alaska Power Administration

For [engineering and economic investigations to promote the development and utilization of the water, power, and related resources of Alaska, and for] necessary expenses of operation and maintenance of projects in Alaska and of marketing electric power and energy, [$3,281,000] $2,881,000, to remain available until expended. (Public Law 99-141, making appropriations for energ and water development, 1986.)

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

POWER MARKETING - ALASKA POWER ADMINISTRATION

The Alaska Power Administration is responsible for operation, maintenance and marketing of power for Alaska's two Federal hydroelectric projects -- the 30,000-kW Eklutna Project near Anchorage and the 47,160-kW Snettisham Project near Juneau. Operation and maintenance is accomplished in a manner that: insures integrity of the Federal investment; maximizes reliability of service; maximizes energy production; and minimizes long-term costs. Power is marketed to achieve the most widespread use at lowest possible rates consistent with sound business principles and repayment requirements. Public benefits from other uses of project lands and facilities include visitations, recreation, fisheries development, and municipal water supply.

The request assumes work will continue towards transfer of the APA projects to non-Federal ownership, but that Federal funding for the APA programs will need to be continued up to the time of the actual transfer. It is now expected that the transfer will not occur before FY 1989.

Although funds are included in the budget for operating the power marketing administrations in 1987, the Administration will actively seek to privatize these utility systems. Utilities are not normally a Federal responsibility, and non-Federal owners can operate the PMA's as efficiently, or more efficiently, than the Federal government.

The Administration will pursue privatization through an open process. It will be guided by the following principles: (1) seek a fair return to the Federal taxpayers from the privatization of these assets, (2) recognize the benefits currently enjoyed by existing customers, and (3) recognize and provide appropriate protections for the personnel benefits of Federal employees.

Before implementation of privatization, the Administration will seek the views of, and promote interest among, concerned groups and individuals, including Congressional delegations, State and local officials, current customers, the financial community, and public power and private sector energy interests.

It is expected that the Power Administration will be sold with all the PMA's being transferred from Federal control by FY 1991. In the interim, the FY 1987 budget proposes to modify PMA capital investment repayment practices legislatively, consistent with sound business principles, to protect the interests of the Nation's taxpayers. These modifications require repayment of the unpaid balance of the original federal investment at a level not less than would be required under a fixed, straight-line amortization schedule for each power investment financed by appropriations and placed in service. This requirement would not apply to irrigation investments. Repayments of principal, if necessary, can be deferred, subject to the same terms and conditions applicable to deferred interest payments (e.g., current interest rates are used because the deferral helps finance current operations). The impact of this repayment proposal is relatively modest compared to those proposals made last year in the 1986 budget.

FY 1985 and FY 1986 accomplishments include:

- Continue satisfactory progress on normal operation and maintenance activities for the Eklutna and Snettisham hydroelectric projects.
- Continue full utilization of energy and power capability at the Eklutna Project; continue full utilization of Snettisham Project firm energy.
- Marketed 309 million kilowatt hours in FY 1985 with gross revenues of $6,866,000; estimated FY 1986 amounts are 336 million kilowatt hours and $7,732,000.

- Complete major maintenance and replacement items in FY 1985.
    - Complete engineering and design and contract for purchase and installation of equipment for automating the Eklutna powerplant. Actual installation begins in FY 1986 and system will be complete and fully operational by the end of FY 1987.
    - Complete design to remove Eklutna Project transmission line from the Knik River Bridge. Relocation deferred pending action by State Highway Department.
    - Purchase wicket gate bushings for Eklutna Project.
    - Purchase VHF radio and cartridge filters for Snettisham Project.
    - Complete removal of Salisbury Ridge line (old Snettisham transmission line). The aluminum structures were salvaged in FY 1984. About 96 wood poles and associated hardware remain and will be removed in FY 1985 and FY 1986.
- Complete major maintenance and replacement items in FY 1986.
    - Complete change in delivery point from Eklutna Project's Anchorage Substation to Eklutna Powerplant.
    - Initiate procurement of replacement turbine runner and peripheral equipment for Eklutna Project.
    - Replace and dispose of transformers containing PCB oil at the Eklutna Project.
    - Complete cleanup of Salisbury Ridge line.
    - Inspect Eklutna tailrace to determine extent of deterioration and sluffing of retaining wall and repairs required.
    - Purchase equipment and vehicle replacements for Snettisham Project: zinc-oxide arresters, snowblower attachment, portable hydraulic winch, and tracked vehicle.
- Continue cooperation with the Corps of Engineers toward early completion of the Crater Lake unit of Snettisham Project, with power on line now expected in early FY 1989.
- Continue annual summer maintenance and inspection program on Snettisham transmission line.
- Continue cooperation with State of Alaska on State salmon hatchery at Snettisham Project; with Cook Inlet Aquaculture Association toward development of a similar facility at Eklutna; and with Municipality of Anchorage on its Eklutna Water Supply Project.

Specific objectives for FY 1987 include:

- Work will continue on developing a proposal for an orderly transfer of Alaska Power Administration facilities to non-Federal ownership.
- After completion of the Eklutna automation project, develop contract for utility operation by supervisory control similar to present operations contract at Snettisham.
- Market an estimated 338 million kilowatt hours in FY 1987 with gross revenues of $9,310,000. Revenues assume implementation of repayment reform proposals contained in the President's budget.

- Perform all necessary maintenance to project facilities, including scheduling and installing necessary major replacements and improvements to those facilities, so long as the projects remain in Federal ownership.

- Market project power in accordnace with authorizing legislation to achieve widespread benefits at lowest rates consistent with sound business principles and repayment requirements.

- Continue full utilization of Eklutna Project energy and peaking capability; maximize energy production form the Snettisham Project; cooperate with customers to minimize demand on oil-fired generators pending completion of Crater Lake; facilitate completion of Crater Lake at the earliest possible date.

- Enhance public use of project lands and facilities for other purposes, including visitations, reservoir recreation, fisheries development, and municipal water supply.

Funds in the amount of $200,000 were provided in FY 1984 to be used only in the event of an emergency. These funds have not been expended and remain available.

APA proposes to continue the net-billing arrangement with Alaska Electric Light and Power Company to cover cost of non-Federal operators for Snettisham Project, and to develop a similar arrangement with one of the Eklutna customer utilities for oepration of that project. Total estimated amount to be net-billed in FY 1987 is $350,000

Accomplishments of these objectives will result in Alaska Power Administration meeting its responsibility of operations, maintenance, and power marketing for the two Federal hydroelectric projects in Alaska.

NARRATIVE JUSTIFICATION

FY 1987 Budget Request

Alaska Power Administration is responsible for operation, maintenance, and power marketing for two Federal hydroelectric projects in Alaska. The operating projects are the 30,000-kW Eklutna Project near Anchorage and the 47,160-kW Snettisham Project near Juneau. Project facilities include dams, reservoirs, powerplants, transmission systems, and necessary maintenance facilities. Power is marketed at wholesale to five Alaskan utilities. The Projects represent a current Federal investment of $114,000,000 and a replacement value in excess of $275,000,000.

Total funding for Alaska Power Administration in FY 1987 is $3,281,000. The FY 1987 budget request provides $2,881,000 of new authority with an additional $400,000 available from unobligated balances.

Program objectives in operating, maintaining, and marketing power from Eklutna and Snettisham are:

- o Maximize energy production, provide reliable service to customers, and minimize long-term costs while protecting the Federal investment.
- o Market power in accordance with authorizing legislation; continue full utilization of Eklutna and Snettisham energy and peaking capability; expand Snettisham capability within present authorization by completion of construction of Crater Lake unit in FY 1989.
- o Continue to enhance public use of project lands and facilities, visitation, reservoir recreations, and cooperation with Alaska Department of Fish and Game in salmon production program at Snettisham Project and with Cook Inlet Aquaculture Association for their hatchery at Eklutna Project. Continue cooperation with Municipality of Anchorage on its Eklutna Water Supply Project.

Other Program objectives include:

- o Transfer of APA facilities to the State or other non-Federal ownership in Alaska.
- o Continue full range of administrative and management services in support of program objectives.

The request includes $2,459,000 for normal, continuing operation, maintenance, and marketing functions, of which $440,000 is for major replacement and maintenance items for the following activities:

- o $125,000 to replace and dispose of neutral grounding transformers and capacitors at the Snettisham Project. Because PCB's have been declared hazardous material, replacement and disposition of this equipment is mandatory to prevent possible serious problems in the future. The PCB contaminated equipment will be shipped to an approved disposal site.
- o $275,000 for other major maintenance items including repair of Eklutna tailrace and summer line maintenance and inspection programs at both projects. Repair of the Eklutna tailrace will be timed to take place when Eklutna Water Project is shut down for construction of the Eklutna Water Project tie to APA's conduit at Eklutna Lake. Repair of the tailrace tunnel adit will entail installation of a coffer dam. Replacement of the end wall and stop log guides will also require additional reinforcement and foundation support.
- o $40,000 for equipment and vehicle replacements for Eklutna and Snettisham Projects:

- -- Replace 1968 Ford 3/4 ton line truck at Eklutna Project with a new, fuel efficient 4 X 4 pickup. Maintenance costs are increasing and the existing truck has reached the end of its useful life.
- -- Purchase warehouse fork lift for Eklutna Project. Fork lift will be used to store and retrieve equipment in the warehouse and storage yard.
- -- Replace 1979 Jeep truck at the Snettisham Thane Substation. The Jeep is used for plowing snow around substation. Again, maintenance costs have increased and the Jeep has reached the end of its useful life.

APA will continue the contract with Alaska Electric Light and Power Company for operations of the Snettisham Project and the net-billing arrangement for costs under this contract. Work has started towards a similar operations contract for Eklutna which would go into effect on completion of the automation contract. APA proposes to use net-billing for this contract, also. Estimate total FY 1987 amounts to be net-billed for both projects is $950,000 or 8% of projected revenues.

The request includes $477,000 for administrative and management support services in support of the power operation, maintenance and marketing programs. This covers costs of the Administrator's Office, the staff work in support of the proposed transfer, rent and utilities for APA headquarters office, program and budget, finance, accounting, personnel management, property management, procurement, contract administration, telecommunications, office equipment, computer services, and mails and files.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

Power Marketing - Alaska Power Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Approp.	FY 1986 Adj. Approp.	FY 1987 Base	FY 1987 Request	Request vs. Base
Operation and Maintenance	$3,233	$3,245	$2,715	$3,281	$ +566
Emergency Fund	--	--	--	--	--
Total, Alaska Power Administration	$3,233	$3,245	$2,715	$3,281	$ +566
Deferral Applied				-400	
New Budget Authority Requested				$2,881	
Staff Total FTE's	37	38	38	38	-0-

Authorization: Section 302, Department of Energy Organization Act of 1977.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
Alaska Power Administration
(In Thousands of Dollars)

FY 1986 Appropriation	$3,245
- Major maintenance items, Eklutna & Snettisham	- 125
- Complete cleanup of Salisbury Ridge transmission line	- 50
- Replacement of PCB contaminated equipment, Eklutna	- 185
- One-time equipment and vehicle replacement and new purchases for Eklutna & Snettisham	- 170
- Replace PCB contaminated equipment, Snettisham	+ 125
- Major maintenance items, Eklutna & Snettisham	+ 275
- Equipment and vehicle replacements for Eklutna & Snettisham	+ 40
- Increase in operation, maintenance, and administration of programs	+ 126
FY 1987 Budget Request	$3,281
Less: FY 1986 Deferral Applied	-400
	$2,881

Department of Energy
FY 1987 Congressional Budget
Key Activity Summary
Alaska Power Administration

Key Activity	Estimated Activities During FY 1986	Planned Activities During FY 1987
Operation and Maintenance	Total operation, maintenance and marketing expenses including the following: $3,245	Total operation, maintenance and marketing expenses including the following: $2,881
	--Replace PCB contaminated equipment, Eklutna Project.	--Replace PCB contaminated equipment, Snettisham Project.
	--Complete Salisbury Ridge transmission line clean-up.	--Continue major maintenance items, equipment, and vehicle replacements.
	--Continue major maintenance items, equipment, and vehicle replacements.	--Continue administrative and management support services for power operation, maintenance, and marketing programs.
	--Continue administrative and management support services for power operation, maintenance, and marketing programs.	

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF ESTIMATES BY APPROPRIATION
ALASKA POWER ADMINISTRATION
(In thousands of dollars)

	FY 1985 Actual		FY 1986 Estimate		FY 1987 Request	
	BA	BO	BA	BO	BA	BO
Power Marketing..........	$3,233	$3,077	$3,245	$3,671	$2,881	$3,281

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
AMOUNTS AVAILABLE FOR OBLIGATION
ALASKA POWER ADMINISTRATION
(In thousands of dollars)

	FY 1986	FY 1987
Appropriation Power Marketing	$ 3,245	$ 2,881
Proposed Supplementals	-----	-----
Comparative Transfer to:	-----	-----
Comparative Transfer from:	-----	-----
Subtotal, Budget Authority	$ 3,245	$ 2,881
Receipts and Reimbursements:		
Unobligated Balances, Start of Year ...	903	600
Unobligated Balances, End of Year	- 600	- 200
Total, Obligations	$ 3,548	$ 3,281

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SYSTEMS STATISTICS

ALASKA POWER ADMINISTRATION
(In thousands of dollars)

Generating capacity:			
Installed capacity (kW)	77,160	77,160	77,160
Leasing capacity (kW)	-----	-----	-----
Peak capacity (kW)	77,160	77,160	77,160
Generating stations:			
Generating projects (No.)	2	2	2
Substations/switchyards (No.)	5	5	5
Substations/switchyards capacity)	237,000	237,000	237,000
Available energy:			
Energy generated (MWh)	336,000	360,000	361,000
Energy purchased (MWh)	-----	-----	-----
Energy available for marketing (MWh)	329,000	355,000	356,000
Transmission lines (circuit miles):			
115 kV	60	60	60
138 kV	42	42	42
Total circuit miles	102	102	102
Revenues:			
Annual gross power revenues a/	$ 6,866	$ 7,732	$ 9,310 b/
Prior year adjustments	-----	-----	-----
Total power revenues	$ 6,866	$ 7,732	$ 9,310
Annual gross revenues:	$ 6,866	$ 7,732	$ 9,310
Federal investment allocated to commercial power:			
Generation equipment	$ 83,040	$ 83,040	$ 83,040
Transmission facilities	$ 30,145	$ 30,145	$ 30,145
Total investment	$113,185	$113,185	$113,185

a/ Includes power sales, wheeling, and other revenues.

b/ Assumes modified repayment reform.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
POWER MARKETED, WHEELED OR EXCHANGED BY PROJECT

ALASKA POWER ADMINISTRATION

Project	State	No. of Plants	Installed Capacity(KW)	FY 1985 Actual Power(GWh)	FY 1986 Estimated Power(GWh)	FY 1987 Estimated Power(GWh)
Power Marketed						
Eklutna	Alaska	1	30,000	167	183	185
Snettisham	Alaska	1	47,160	142	153	153
Total, Power Marketed		2	77,160	309	336	338
Power Wheeled and Exchanged						
Eklutna	Alaska	1	13	259	100	100

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

PENDING LITIGATION

ALASKA POWER ADMINISTRATION

NONE

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Conference	Gramm-Rudman-Hollings Reduction	Adj. Approp. Total
Alaska Power Administration			
Operation and Maintenance	$ 3,281	$ -36	$ 3,245
General Investigations	---	---	---
Program Direction	---	---	---
Emergency Fund	---	---	---
Total, Alaska Power Administration	$ 3,281	$ -36	$ 3,245

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET
POWER MARKETING ADMINISTRATION

Revenue and Receipts Report
(In thousands of dollars)

	FY 1985	FY 1986	FY 1987[1]	FY 1988	FY 1989	FY 1990	FY 1991
Alaska Power Administration							
Gross Revenues	$6,866	$7,732	$9,310	$9,330	$10,773	$12,857	$12,757
Receipts:							
Sale and transmission of electric energy - Eklutna Project	$2,647	$3,007	$3,096	$3,096	$ 3,096	$ 3,096	$ 3,096
Sale and transmission of electric energy - Snettisham Project	$4,219	$4,725	$6,214	$6,234	$ 7,677	$ 9,761	$ 9,661
Net billing amount credited back to appropriation as an offsetting receipt	$ 205	$ 283	$ 350	$ 371	$ 393	$ 417	$ 442
Percent of sales to preference customers	57%	57%	59%	59%	60%	61%	62%
Energy Sales from Power Marketed (billions of kilowatt hours)	.3	.4	.4	.4	.4	.4	.4

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[1] Revenue estimates for FY 1987-1991 assume modified repayment reform.

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Bonneville Power Administration Fund

Expenditures from the Bonneville Power Administration Fund, established pursuant to Public Law 93-454, are approved for [Nez Perce Fish Propagation Facility, Yakima Hatchery, Colville Hatchery, Dryden Dam Fish Passage Facilities, and Tumwater Falls] Enloe Dam Fish Passage Facilities. Expenditures are also approved for[:] (1) acquisition of one fixed wing aircraft for replacement only and (2)] official reception and representation expenses in an amount not to exceed $2,500.

During fiscal year [1986] 1987, and within the resources and authority available, gross obligations for the principal amount of direct loans shall not exceed $31,337,000. (Public Law 99-141, making appropriations for energy and water development, 1986.)

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

PROGRAM AND PERFORMANCE

Bonneville Power Administration (BPA) is the Federal electric power marketing agency in the Pacific Northwest. BPA markets hydroelectric power from 21 multipurpose water resource projects of the U.S. Army Corps of Engineers and 9 projects of the U.S. Bureau of Reclamation, plus some energy from non-Federal generating projects in the region. These generating resources and BPA's transmission system, planned by the end of FY 1987 to consist of an estimated 14,451 circuit-miles of high-voltage transmission lines and 385 substations, are operated as an integrated power system with operating and financial results combined and reported as the Federal Columbia River Power System. BPA is the largest power wholesaler in the Northwest and provides about four-fifths of the region's electric power transmission capacity.

BPA is responsible for meeting the net firm power requirements of its requesting customers through a variety of means, including energy conservation programs, acquisition of renewable and other resources, and power exchanges with utilities both in and outside the region.

BPA will continue its operations on the basis of its self-financing authority and the new borrowing authority provided by the Pacific Northwest Electric Power Planning and Conservation Act (Pacific Northwest Power Act) (Public Law 96-501) for energy conservation, renewable energy resources, and capital fish facilities. Authority to borrow available to the BPA is available on a permanent, indefinite basis. This authority is limited only in that the amount of borrowing outstanding at any time cannot exceed $3,750,000,000.

Although funds are included in the budget for operating BPA in 1987, but the Administration will actively seek to privitize this utility system. Utilities are not normally a Federal responsibility, and non-Federal owners can operate BPA as efficiently, or more efficiently, than the Federal government.

The Administration will pursue privitization through an open process. It will be guided by the following principles: (1) seek a fair return to the Federal taxpayers from the privatization of these assets, (2) recognize the benefits currently enjoyed by existing customers, and (3) recognize and provide appropriate protections for the personnel benefits of Federal employees.

Before implementation of privitization, the Administration will seek the views of, and promote interest among, concerned groups and individuals, including Congressional delegations, State and local officials, current customers, the financial community, and public power and private sector energy interests.

Budget programs:

1. Resource Planning, Acquisition, and Oversight - Provides for the orderly planning, acquisition, and oversight of reliable, cost-effective, environmentally acceptable resources, including resources purchased prior to the Pacific Northwest Power Act, needed to serve BPA's portion of the region's forecasted net electric load requirements that cannot be met through cost-effective conservation.

2. Residential Exchange - Provides for extending the benefits of low-cost Federal power to the residential and small farm customers of investor-owned and publicly-owned utilities, in accordance with the Pacific Northwest Power Act.

3. Energy Conservation - Provides for funding conservation measures, including home energy efficiency, commercial energy efficiency, street lighting, utility distribution system loss reduction, industrial technological transfers, passive solar energy applications, and conservation measures for new home and commercial building construction.

4. System Planning and Construction - Provides for continuation of construction work on transmission lines, substations and related facilities initiated in prior years, initiation of construction on system additions, and planning and research and development for a reliable, efficient and cost-effective regional transmission system. During FY 1987, BPA plans to construct and energize approximately 44 miles of line and 1 substation.

5. Operating programs

   (a) System Operations - Provides for operating an estimated 14,429 miles of line and 387 substations of the BPA transmission system during FY 1987.

   (b) System Maintenance - Provides for maintaining the facilities and equipment of the BPA transmission system in FY 1987.

   (c) Power Marketing - Provides for forecasting regional demand; negotiating power sales and wheeling, billing, and servicing these contracts; reviewing and establishing wholesale power and wheeling rates; and encouraging public participation in the formation of BPA policies and programs.

   (d) Power Scheduling - Provides for the scheduling of power.

   (e) Fish and Wildlife - Provides for protection, mitigation and enhancement of fish and wildlife affected by hydroelectric facilities on the Columbia River and its tributaries, in accordance with the Pacific Northwest Power Act.

   (f) Planning Council - Provides for activities of the Pacific Northwest Electric Power and Conservation Planning Council required by the Pacific Northwest Power Act.

6. Interest on Borrowings - Provides for payments to the U.S. Treasury for interest on borrowings to finance BPA's construction, energy conservation, and fish and wildlife programs under $3,750,000,000 borrowing authority provided by the Federal Columbia River Transmission System Act (FCRTSA) as amended by the Pacific Northwest Power Act and replenished by Public Law 98-50.

7. Associated Project Costs - Provides for repayment of the operation and maintenance (O&M) costs of the 30 U.S. Army Corps of Engineers and U.S. Bureau of Reclamation power generating projects, interest and amortization on the U.S. Bureau of Reclamation capital investment in power generating facilities, and coordination agreement payments to the Federal Energy Regulatory Commission.

8. Reimbursable - Provides for 28 percent of Hanford Generating Project operating expenses paid by two investor-owned utilities through trust fund arrangements. Also provides for services such as construction, operation and maintenance of transmission facilities when requested and financed by other entities.

Contingencies: Although contingencies are not specifically funded, the need may arise to provide for purchase of power in low-water years; for repair and/or replacement of facilities affected by natural and man-made emergencies, including the resulting additional costs for contracting, construction, and operation and maintenance work; for unavoidable increased costs for the planned program due to necessary but unforeseen adjustments, including engineering and design changes, contractor and other claims and relocations; or for payment of a retrospective premium adjustment in excess nuclear property insurance policy, in the event one of the participating utilities has an accident with property damage in excess of $500 million.

Financing: The FCRTSA provides for the use by BPA of all receipts, collections, and recoveries in cash from all sources, including the sale of bonds, to finance the annual budget programs of BPA. These receipts result primarily from the sale of power and wheeling. The FCRTSA also provides for authority to borrow from the U.S. Treasury at rates comparable to borrowings at open market rates for similar issues. As amended by the Pacific Northwest Power Act, and replenished by Public Law 98-50, it allows for $3,750,000,000 of borrowing to be outstanding at any time. Borrowing authority estimated for use in FY 1987 is $276,100,000.

In FY 1985, BPA made Treasury payments of $670.7 million and expects to make payments of $670.1 million in FY 1986 and $654.1 million in FY 1987. The FY 1987 payment will be distributed as follows: Corps and Bureau O&M and FERC payments ($95 million), interest on bonds and appropriations ($410.5 million), and amortization ($148.6 million).

The Administration is proposing legislation to modify the repayment criteria that would require an additional $139,000,000 in revenues in FY 1987.

Direct loans: The limitation on direct loans is $20,000,000 in FY 1987.

Operating results: Total revenues and reimbursements are forecast at approximately $2,967,800,000 in FY 1987. The modification of debt repayment criteria is shown under the Departments' legislative program.

It should be noted that BPA's revenue forecasts are based on several critical assumptions about both the supply of and demand for Federal energy. Deviation from the assumed conditions may result in variation in actual revenues of several hundred million dollars from the forecast. Estimated retained income for FY 1987, based on BPA's current revenue and expense estimates, is $266,831,000, an increase of $51,482,000 from FY 1986.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

FY 1987 BUDGET PROPOSAL

DEFEDERALIZATION OF BPA

Funds are included in the budget for operating BPA in FY 1987, but the Administration will actively seek to defederalize BPA by FY 1988. The Administration's position is that although there are historical reasons why BPA was created as a Federal agency, there may no longer be a need for continued Federal operation of this utility system. Utilities are not normally a Federal responsibility and non-Federal owners may be able to operate BPA as efficiently, or more efficiently, than the Federal government.

The Administration will pursue defederalization through an open process. It will be guided by the following principles: (1) seek a fair return to the Federal taxpayers from the privatization of these assets, (2) recognize the benefits currently enjoyed by existing customers and other interests, and (3) recognize and provide appropriate protections for the personnel benefits of Federal employees.

Before implementation of defederalization, the Administration will seek the views of, and promote interest among, concerned groups and individuals, including Congressional delegations, State and local officials, current customers, the financial community, and public power and private sector energy interests.

Although the final terms and conditions of the sale will be developed through a public process, the President's FY 1987 budget estimates assume the Federal power generation and transmission facilities overseen by BPA will be sold at a price equal to the unpaid Federal investment of $8.85 billion on October 1, 1987. The budget assumes payments to the Treasury will be received over four years starting in FY 1988.

MODIFIED REPAYMENT PROPOSAL

Although it is expected that BPA will be sold to non-Federal interests, in the interim legislation is being prepared to modify BPA's capital investment repayment practices. This legislation is expected to protect the interests of the Nation's taxpayers and to be consistent with sound business principles. These modifications require repayment of the unpaid balance of the original Federal investment at a level not less than would be required under a fixed, straight-line amortization schedule for each power investment financed by appropriations and placed in service. This requirement would not apply to irrigation investments. BPA bonds would continue to be repaid under the terms already negotiated between BPA and Treasury. Repayments of principal, if necessary, could be deferred, subject to the same terms and conditions now applicable to deferred interest payments (e.g.,, current interest rates are used because the deferral helps finance current operations). The impact of this repayment proposal is relatively modest compared to the proposal made last year in the FY 1986 budget.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

FY 1987 CURRENT SERVICES PROGRAM PROFILE

Bonneville Power Administration (BPA), one of the Department of Energy's five Power Marketing Administrations (PMA's) nationally, is the power marketing agency serving the Pacific Northwest, a 300,000-square-mile service area that encompasses Oregon, Washington, Idaho, and western Montana, and portions of several other states in the Columbia River drainage basin. BPA markets hydroelectric power from 30 U.S. Army Corps of Engineers (Corps) and U.S. Bureau of Reclamation (Bureau) projects, and from certain non-Federal hydro and thermal generating facilities in the region. BPA also markets and exchanges electric power over the Pacific Northwest-Pacific Southwest (PNW-PSW) Intertie, and over interconnections with utilities in British Columbia.

BPA was created in 1937. Fiscal Year 1987 will mark 50 years of providing low-cost, reliable electric service to the Pacific Northwest.

Today, BPA provides a wide range of electric energy services to the people of the Pacific Northwest. BPA must keep its power rates as low as possible, while assuring availability of financial resources necessary to meet its obligations over the long term. In keeping with BPA's operation as an electric utility, the Federal Columbia River Transmission System Act of 1974 (Public Law 93-454--Transmission Act) placed BPA on a self-financed basis with "revolving fund" authority under the provisions of the Government Corporation Control Act to fund its operations from power sales revenues and borrowings from the Treasury.

With the passage in 1980 of Public Law 96-501, the Pacific Northwest Electric Power Planning and Conservation Act (Pacific Northwest Power Act), BPA's long standing utility role and responsibilities were greatly expanded to include meeting regional load growth. New responsibilities were added for energy conservation, enhancement of fish and wildlife, public involvement in electric energy matters, and power exchanges with investor-owned utilities.

Projected Revenues and Expenses

BPA's projected financial and programmatic operations under these authorities are shown in the table on the following page.

Treasury payments cover principal and interest on the Federal investment in hydroelectric projects and transmission facilities in the Pacific Northwest, and operation and maintenance costs for Corps and Bureau projects. In FY 1985 BPA made Treasury payments of $[illegible] million and expects to make payments of $[illegible] million in FY 1986 and $[illegible] million in FY 1987, under Current Services estimates.

BONNEVILLE POWER ADMINISTRATION
PROJECTED REVENUES AND EXPENSES
(In thousands of dollars)

	FY 1985	FY 1986	FY 1987	
			Current Services	Proposed Program 1/
Total Revenues and Other Receipts	[illegible]	[illegible]	[illegible]	[illegible]
Less Expenses:				
Residential Exchange	[illegible]	[illegible]	[illegible]	[illegible]
Resource Planning & Acq.	[illegible]	[illegible]	[illegible]	[illegible]
Energy Conservation	[illegible]	[illegible]	[illegible]	[illegible]
Sys. Planning & Construction	[illegible]	[illegible]	[illegible]	[illegible]
Operating Programs	[illegible]	[illegible]	[illegible]	[illegible]
Reimbursable	[illegible]	[illegible]	[illegible]	[illegible]
Adjustments to Cash	[illegible]	[illegible]	[illegible]	[illegible]
Available for Treasury Payments	[illegible]	[illegible]	[illegible]	[illegible]
Application of Treasury Payments:				
Corps and Bureau O&M, IRRIG Payments	[illegible]	[illegible]	[illegible]	[illegible]
Interest	[illegible]	[illegible]	[illegible]	[illegible]
Amortization	[illegible]	[illegible]	[illegible]	[illegible]
Total Treasury Payments	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Capital Investment Plan

[illegible]

1/ [illegible]

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

SUMMARY OF CHANGES FROM CURRENT SERVICES, INCLUDING DEFEDERALIZATION
NET OBLIGATIONS/NET OUTLAYS

($ in 000's)

	FY 1986		FY 1987		FY 1988	FY 1989	FY 1990	FY 1991
	Net Obligations	Net Outlays	Net Obligations	Net Outlays	Net Outlays	Net Outlays	Net Outlays	Net Outlays
Current Services	+5,400	-31,615	-28,900	-43,100	-34,300	-126,700	-196,000	-189,700
Gramm-Rudman (G-R) Impact 1/	-2,477	-2,180	0	-297	0	0	0	0
Current Services, Net of FY 1986 G-R	(+2,923)	(-33,795)	(-28,900)	(-43,397)	(-34,300)	(-126,700)	(-196,000)	(-189,700)
Revised Repayment Proposal Impact 2/	--	--	-134,300	-134,300	-100,800	-90,300	-86,400	-77,400
Defederalization Impact 3/	--	--	--	--	+135,100	+217,000	+282,400	+267,100
NET 4/	+2,923	-33,795	-163,200	-177,697	0	0	0	0

1/ The Balanced Budget and Emergency Deficit Control Act of 1985 (Section 256) contained a provision for the reduction of administrative expenses of all Federal agencies. This reduction of administrative expenses applied to the Bonneville Power Administration programs results in a decrease in FY 1986 obligations and outlays and a carry-over impact on outlays in FY 1987, as shown above.

2/ Legislation is being proposed to change BPA's repayment practice to a fixed 50 year (or the end of an investment's service life, whichever is less) straight-line repayment schedule for amortization of the Federal appropriated investment. The difference between the amounts shown here for Repayment Proposal Impact (e.g., $134 million in FY 1987) and the increased revenues associated with the Repayment Proposal shown elsewhere in this document (e.g., $139 million in FY 1987) are credited as receipts elsewhere in the Federal budget. Amounts shown relate only to the BPA Fund.

3/ Foregone revenues which are expected to be more than offset by receipts from the sale of BPA.

4/ Proceeds from the sale of BPA are not listed in this table. Any such receipts would be deposited on a Treasury account separate from the BPA account. The zeros shown for net outlays in the years FY 1988-1991 reflect the assumption that the BPA Fund would not appear in the Budget.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

IMPACT OF MODIFIED REPAYMENT PROPOSAL ON FEDERAL COLUMBIA RIVER POWER SYSTEM 1/

($ in millions)

	FY 1987			FY 1988 2/			FY 1989 2			FY 1990 2/			FY 1991 2/		
	Current Services	Change	Repymt Proposal	Current Services	Change	Repymt Proposal	Current Services	Change	Repymt Proposal	Current Services	Change	Repymt Proposal	Current Services	Change	Repymt Proposal
Interest	211.3	-16.7	194.6	230.6	-8.3	222.3	237.2	+.7	237.9	227.9	+7.9	235.8	209.0	+13.4	222.4
Assoc. Project Cost															
Bureau Amortization	0	+21.8	21.8	0	+23.2	23.2	0	+23.2	23.2	0	+23.2	23.2	0	+23.2	23.2
Bureau Interest	26.7	0	26.7	28.9	-.7	28.2	28.9	-1.4	27.5	28.9	-2.2	26.7	28.9	-2.9	26.0
Other	95.0	0	95.0	101.4	0	101.4	108.0	0	108.0	116.6	0	116.6	123.4	0	123.4
Total APC	121.7	+21.8	143.5	130.3	+22.5	152.8	136.9	+21.8	158.7	145.5	+21.0	166.5	152.3	+20.3	172.6
Total Programs	2,938.9	+5.1	2,944.0	3,186.4	+14.2	3,200.6	3,303.4	+22.5	3,325.9	3,463.2	+28.9	3,492.1	3,696.8	+33.6	3,730.5
Total, Revenues & Reimbursements 3/	2,967.8	+139.4	3,107.2	3,220.7	+115.0	3,335.7	3,430.1	+112.8	3,542.9	3,659.2	+115.3	3,774.5	3,886.5	+111.1	3,997.6
Capital Transfers															
BPA Approp. Int.	58.8	0	58.8	58.8	-2.4	56.4	58.8	-4.7	54.1	58.8	-7.1	51.7	58.8	-9.4	49.4
Corps Approp. Int.	113.7	0	113.7	108.3	-3.8	104.5	112.6	-7.5	105.1	116.3	-7.8	108.5	116.3	-7.5	108.8
Amortization															
BPA Bonds	88.3	-29.0	59.3	175.2	-71.1	104.1	230.2	-77.0	153.2	286.6	-87.1	199.5	303.1	-103.4	199.7
Corps	60.3	+102.9	163.2	0	+117.7	117.7	0	+119.1	119.1	0	+128.0	128.0	0	+137.4	137.4
BPA	0	+60.4	60.4	0	+60.4	60.4	0	+60.4	60.4	0	+60.4	60.4	0	+60.4	60.4
Subtotal	148.6	+134.3	282.9	175.2	+107.0	282.2	230.2	+102.5	332.7	286.6	+101.3	387.9	303.1	+94.4	397.5
Total Cap. Transfers	321.1	+134.3	455.4	342.3	+100.8	443.1	401.6	90.3	491.9	461.7	+86.4	548.1	478.2	+77.5	555.7
Net Obligations	-28.9	-134.3	-163.2	-34.3	-100.8	-135.1	-126.7	-90.3	-217.0	-196.0	-86.4	-282.4	-189.7	-77.4	-267.1
Net Outlays	-43.1	-134.3	-177.4	-34.3	-100.8	-135.1	-126.7	-90.3	-217.0	-196.0	-86.4	-282.4	-189.7	-77.4	-267.1

*NOTE: Totals may not add due to rounding.

1/ Legislation is being proposed to change BPA's repayment practice to convert to a fixed 50 year (or the end of an investment's service life, whichever is less) straight-line repayment schedule for amortizations of the Federal appropriated investment.
The Gramm-Rudman reductions are not relevant to this table.

2/ The President's FY 1987 budget assumes that amounts for FY's 1988-1991 will be dropped from the budget to reflect the sale of BPA to non-Federal owners.

3/ The revenue requirement will change to reflect the increase in each year.

resources, including conservation, transmission system additions and replacements, and the fish and wildlife mitigation measures that are required by the Pacific Northwest Power Act. FY 1985 actuals and estimated investments for FY 1986 and 1987 are shown below.

CAPITAL INVESTMENTS BY PROGRAM
(In thousands of dollars)

	FY 1985	FY 1986	FY 1987
Energy Conservation	138,343	85,300	86,400
System Planning & Construction	136,787	234,500	172,800
Fish & Wildlife	13,556	13,200	16,900
Total Capital Investments (Borrowing Authority)	288,771	333,000	276,100

BPA's capital investments are financed with funds borrowed from the U.S. Treasury, which are repaid from power sales revenues.

The Senate Subcommittee on Appropriations directed BPA to notify the committee of any change in the planned use of borrowing authority amounting to more than 10 percent of any major program area. In reports on the FY 1986 Appropriations bill, the House and Senate Subcommittees recommended an increment of $293 million in borrowing authority in FY 1986, plus any unused portion from prior years, to fund construction, conservation, and fish and wildlife activities. BPA ended FY 1985 with $87 million in unused borrowing authority, bringing the recommended total to $380 million. However, BPA will use only 88 percent of that authority (or $333 million) in FY 1986 due to program reductions and [illegible]. This constitutes the notification directed by the committee.

The program comparison above is substantially influenced by expected load growth. BPA's forecast for the 20-year period 1986-2006 projects the region's average annual rate of load growth will be between +0.8 percent and +3.7 percent, with a median growth rate of 1.2 percent. Last year's forecasted median rate was 1.4 percent.

Status of Revenues

It should be noted that because BPA does not receive appropriations, the fiscal plan outlined above is dependent on a key variable -- revenues from operations. BPA's revenues result from sales of power both within and outside the Pacific Northwest. Revenue forecasts are influenced by assumptions about both the supply of Federal energy and the market for the Federal power.

Critical assumptions as to the supply are the amount of water in reservoirs above the Federal hydroelectric dams, and continued availability of thermal generation. A wide variety of assumptions affect the market for energy. The principal factors are the economy in the Pacific Northwest and Pacific Southwest, production levels in the Direct Service Industries, and regional and west coast supplies of energy.

The Current Services tables in the budget show BPA's actual revenues for FY 1985, and the estimates included in the 1985 Rate Case for FY 1986 and beyond. The rate case estimates assume water supplies at relatively conservative levels, a continuation of the region's present economic activity and continued, but limited production by BPA's industrial customers.

While BPA has used these assumptions to predict future revenues as accurately as possible in the coming years, worse than assumed water supply, economic, or industrial conditions could result in annual revenues as much as $400 million lower than projected. By the same token, better than critical water and an improved economy could result in annual revenues substantially higher than projected.

Accordingly, while specific revenue forecasts and associated financial conditions have been shown in tables, they must be recognized as best estimates that may vary within a wide range depending on conditions.

DSI Options

BPA is taking steps to ensure its revenues. In view of the precarious situation of some of BPA's direct-service industrial customers, primarily the aluminum industry that buys about one third of BPA's power, BPA is pursuing a three part program consisting of (1) the development of a variable power rate that responds to aluminum market conditions, (2) a BPA participation in a partnership program to modernize DSI plants and increase energy efficiency, and (3) a linkage between BPA's industrial firm power rate and its priority firm rate for public utilities. BPA issued a Federal Register Notice of its initial proposal for a variable power rate for Northwest Aluminum smelters in December. The formal hearings on the proposal began on January 6, 1986. This process will involve hearings, testimony, cross examination and rebuttal. This process is scheduled to be completed in May 1986 when a final record of decision could be signed by the BPA Administrator. If approved by the FERC, the variable rate could go into effect in July or August 1986.

Marketing the Surplus

Other revenue enhancing actions involve marketing surplus power. Since BPA expects to have substantial power surpluses through the mid to late 1980's, intensive efforts continue to find markets for this power. If successful, these marketing efforts will make a substantial contribution to BPA's revenues and to its efforts to stabilize power rates in the region.

BPA has undertaken several intra-regional marketing programs for both nonfirm energy and surplus firm power. Incentive rates for DSI and irrigation loads, fuel displacement programs, and development of new markets have helped BPA's short-term sale of surplus power while benefiting the region. BPA continues to pursue opportunities for development and expansion of its new markets.

In addition to seeking improving markets within the region, BPA is actively pursuing marketing and supply opportunities in adjacent regions: both to the Northwest in British Columbia and southwards in California and the Inland Southwest.

At the request of interested prospective buyers, BPA is developing a Firm Displacement Rate. This concept would allow BPA to dispose of its surplus power within the Northwest, while allowing Northwest utilities to increase surplus sales outside the region. BPA is also pursuing opportunities to make direct surplus sales to utilities in the Southwest.

The Role of PNW-PSW Interties

Increased Intertie capacity is central to the longer term success of realizing revenues through BPA's inter-regional marketing efforts. For the past several years, BPA and utilities in both the PNW and the PSW have been cooperating in the development of major additions to the electrical transmission capacity between the two regions. This budget includes funding to continue and complete an expansion of the DC Terminal at Celilo, Oregon. This expansion will increase PNW-PSW Intertie transfer capability by 1100 MW from 2000 MW to 3100 MW. This new start was added by the Congress during the FY 1986 budget process. PSW utilities are constructing similar facilities at the southwest terminal at Sylmar, California.

This budget also includes a FY 1987 construction new start for a Third AC Intertie Reinforcement to be completed May, 1990. This involves upgrade of existing Federal facilities in the Northwest to support energy transfers that will be possible upon construction of the Third AC transmission line in Northern California by Southwest utility interests and the DOE. If BPA and other Intertie owners are able to make satisfactory arrangements for use of the Intertie by other Northwest utilities through subscription, facilities related to the Third AC line may be funded by non-Federal participants. BPA continues to participate with PNW and PSW entities in engineering, economic and environmental analysis of this and any possible further intertie expansions that offer opportunities for sharing lower electric energy costs through increased sales of surplus Northwest power.

Power Supplies

Because of the long term surplus outlined above, BPA's efforts to ensure adequate supplies are also focussed on the long term. BPA is working with others in the region to maintain and enhance long term reserves to meet both planned and unexpected load growth at the lowest cost. Two Nuclear generating plants of the Washington Public Power Supply System, WNP-1 and WNP-3, are currently in deferred construction status, with no funds for construction restart included in BPA's budgets through FY 1991. Other generating resource and energy conservation programs are emphasizing steps necessary to ensure long term availability of power at the least cost.

Supply System Plants

BPA recently reexamined its resource plans for the FY 1988 through FY 1992 time period in its Draft 1986 Resource Strategy. The Draft Strategy concluded that the probability of there being a need to restart construction of Supply System Projects 1 and 3 (WNP-1 and WNP-3) through fiscal year 1992 was not great enough to warrant the inclusion of construction restart costs in the outyear estimates of BPA's FY 1987 Budget. The decrease in FY 1989 through FY 1991 budget estimates from the FY 1986 Congressional Budget reflects the decrease in debt service requirements associated with deferring construction beyond FY 1991. Preservation costs for WNP-1 and WNP-3 have been included in fiscal years 1988 through 1991 as appropriate to reflect this assumption. While the Draft Strategy will not be finalized until February, 1986, it is management's opinion that it is unlikely this conclusion will be changed in the final report.

During fiscal year 1985, BPA and the four investor-owned utilities which own 30 percent of WNP-3 reached a settlement agreement concerning the utilities suit against BPA for delaying construction of WNP-3. Damages stemming from the suits, if successful, could have amounted to more than $2.0 billion. Final court approval of the settlement is pending.

Supply System Project 2 (WNP-2) became operational on December 13, 1984. During fiscal year 1985, the plant's capacity factor was 54 percent mainly due to recirculation pump problems. The plant's power made a significant contribution to BPA's revenues during the period due to the poor hydro conditions stemming from dry weather and poor spring run-off.

Summary

On a current services basis total BPA obligations in FY 1987 are estimated at $2,938,900,000, an increase of approximately $13 million from FY 1986. The most significant programmatic change between fiscal years 1986 and 1987 is a reduction of approximately $63 million in the construction program level due to the award of a large contract for expansion of the DC intertie terminal at Celilo Converter Station in FY 1986, causing an unusual swing in that year's construction program. Changes in other program areas include a slight decrease in WNP-2's expenditures resulting from offsetting receipts as construction contracts are closed out, an increase of about 12 percent in interest expense, and a $10 million increase in the fish and wildlife program as BPA fulfills its responsibilities under the Pacific Northwest Power Act.

BPA's current financial condition continues to improve as the agency marks 50 years of service to the region and the Nation in 1987. This budget reflects the tough actions we have taken to control costs and our continued dedication to deliver "best value" to our customers. It continues operation under its self-financing authority, with no need for appropriations. Consistent with its policy of meeting growing responsibilities with a stable employment the budget assumes continuation of the FY 1986 level of 3480 FTE.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

SYSTEM STATISTICS

	End-of-Year		
	FY 1985 Actual	FY 1986 Estimate	FY 1987 Estimate
Generating capacity			
USCE and USBR hydroelectric plants in Federal Columbia River Transmission System (FCRTS)			
Number of projects	30	30	30
Installed capacity (KW)	19,533,980	19,636,380	19,748,780
Peak capacity (KW)	21,964,800	21,964,800	21,964,800
Available energy (MWh)			
Energy generated at USCE and USBR hydroelectric plants	87,600,000	88,000,000	88,000,000
Conservation	1,325,000	1,700,000	2,100,000
Energy purchased, wheeled, and exchanged	61,000,000	66,500,000	70,000,000
Total Energy Available	149,925,000	156,200,000	160,100,000
Substations			
Number of substations.	383	387	385
kVA capacity	63,566,105	63,810,105	64,925,006
Transmission lines (circuit-miles)			
1000 kV	264	264	264
500 kV	3,992	4,311	4,311
345 kV	709	709	709
287 kV	1,450	1,450	1,450
230 kV	3,974	4,053	4,075
138 kV	93	93	93
115 kV	3,244	3,254	3,254
Lower design voltage	295	295	295
Total circuit-miles	14,021	14,429	14,451
Investments ($ million)			
Transmission facilities (BPA)	2,653	3,181	3,295
USCE and USBR hydroelectric facilities	5,129	5,169	5,337
Conservation	397	606	743
Total	8,179	8,956	9,375

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

CURRENT SERVICES
PROGRAM AND FINANCING SUMMARY
($ 000's)

PROGRAMS

	FY 1985		FY 1986		FY 1987		FY 1988 1/	FY 1989 1/	FY 1990 1/	FY 1991 1/
	Oblig.	Outlays	Oblig.	Outlays	Oblig.	Outlays	Outlays	Outlays	Outlays	Outlays
Resource Planning	950,327	983,500	967,300	952,400	955,900	941,800	1,010,800	1,031,300	1,059,300	1,108,100
Residential Exchange	1,008,838	1,008,800	1,084,200	1,084,200	1,109,600	1,109,600	1,191,100	1,285,400	1,409,100	1,563,800
Energy Conservation	139,474	102,100	106,800	121,000	117,500	117,500	119,500	121,200	129,600	140,300
Sys. Planning & Constr.	147,373	126,700	249,900	206,585	187,100	192,000	252,700	221,500	205,300	221,000
Operating Programs	142,233	142,200	166,900 2/	166,900 2/	187,100	187,100 2/	195,800	209,500	222,000	233,800
Reimbursable	27,083	23,100	47,400	47,400	48,700	48,700	55,600	60,400	64,500	68,500
Interest	164,335	164,300	188,900	188,900	211,300	211,300	230,600	237,200	227,900	209,000
Assoc. Project Costs	105,984	106,000	114,200	114,200	121,700	121,700	130,300	136,900	145,500	152,300
Total Programs	2,685,647	2,656,700	2,925,600	2,881,585	2,938,900	2,929,700	3,186,400	3,303,400	3,463,200	3,696,800

FINANCING

	Accrued Revenue	Cash Receipts	Accrued Revenue	Cash Receipts	Accrued Revenue	Cash Receipts	Cash Receipts	Cash Receipts	Cash Receipts	Cash Receipts
Revenues from Operation	2,867,990	2,893,600	2,872,800	2,865,800	2,919,100	2,924,100	3,165,100	3,369,700	3,594,700	3,818,000
Reimbursements	23,970	24,000	47,400	47,400	48,700	48,700	55,600	60,400	64,500	68,500
Total, Revenues & Reimbursements	2,891,960	2,917,600	2,920,200	2,913,200	2,967,800	2,972,800	3,220,700	3,430,100	3,659,200	3,886,500

NET OBLIGATIONS/OUTLAYS

Net Obligations/ Outlays	-206,313	-260,900	+5,400	-31,615	-28,900	-43,100	-34,300	-126,700	-196,000	-189,700

NOTE: The estimated funding levels in this table are based on current conditions in the Pacific Northwest. Changing regional circumstances may require adjustments within the funding level between subprograms or programs.

1/ The President's FY 1987 budget assumes that amounts for FY's 1988-1991 will be dropped from the budget to reflect the sale of BPA to non-Federal owners.

2/ These estimates do not reflect Gramm-Rudman reductions of $2,477,000 in FY 1986 obligations.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

CURRENT SERVICES
FINANCIAL SUMMARY
Fiscal Years 1985 through 1991

($ 000's)

RESULTS FROM OPERATIONS

	FY 1985		FY 1986		FY 1987		FY 1988 1/	FY 1989 1/	FY 1990 1/	FY 1991 1/
	Revenues/ Oblig.	Cash Recpts/ Outlays	Revenues/ Oblig.	Cash Recpts/ Outlays	Revenues/ Oblig.	Cash Recpts/ Outlays	Cash Recpts/ Outlays	Cash Recpts/ Outlays	Cash Recpts/ Outlays	Cash Recpts/ Outlays
Total Revenues and Reimbursements	2,891,960	2,917,606	2,920,200	2,913,200	2,967,800	2,972,800	3,220,100	3,430,100	3,659,200	3,886,500
Revenue Program										
Resource Planning	950,327	983,500	967,300	952,400	955,900	941,800	1,010,100	1,031,300	1,059,300	1,108,100
Residential Exchange	1,008,838	1,008,800	1,084,200	1,084,200	1,109,600	1,109,600	1,191,100	1,285,400	1,409,100	1,563,800
Energy Conservation	1,109	1,100	21,300	21,300	30,700	30,700	42,100	50,300	57,100	64,700
Sys. Planning & Constr.	11,191	11,200	15,900	15,900	16,300	16,300	16,100	17,900	19,500	23,300
Operating Programs	132,009	132,000	156,400 2/	156,400 2/	168,600	168,600 2/	179,100	192,100	200,900	212,700
Reimbursable	27,083	23,100	47,400	47,400	48,700	48,700	55,100	60,400	64,500	68,500
Interest	164,335	164,300	188,900	188,900	211,300	211,300	230,100	237,200	227,900	209,000
Assoc. Project Costs	105,984	106,000	114,200	114,200	121,700	121,700	110,100	136,900	145,500	152,300
Total Programs	2,400,876	2,430,000	2,595,600	2,580,700	2,662,800	2,648,700	2,857,100	3,011,500	3,183,800	3,402,400
NET PROCEEDS	491,084	487,600	324,600	332,500	305,000	324,100	363,000	418,600	475,400	484,100

1/ The President's FY 1987 budget assumes that amounts for FY's 1988-1991 will be dropped from the budget to reflect the sale of BPA to non-Federal owners.

2/ These estimates do not reflect Gramm-Rudman reductions of $2,477,000 in FY 1986 obligations.

USE OF NET PROCEEDS

	FY 1985		FY 1986		FY 1987		FY 1988 1/	FY 1989 1/	FY 1990 1/	FY 1991 1/
Capital Transfers										
BPA Approp. Interest	57,702	57,700	58,800	58,800	58,800	58,800	58,800	58,800	58,800	58,800
Corps Approp. Int.	127,587	127,600	117,400	117,400	113,700	113,700	108,300	112,600	116,300	116,300
Amortization	215,076 2/	215,100 2/	190,800	190,800	148,600	148,600	175,200	230,200	286,600	303,100
Subtotal	400,365	400,400	367,000	367,000	321,100	321,100	342,300	401,600	461,700	478,200
Capital Program										
Energy Conservation	138,365	101,000	85,500	99,700	86,800	86,800	76,600	70,900	72,500	75,600
Sys. Planning & Const	136,182	115,500	234,000	190,685	170,800	175,700	235,900	203,600	185,800	197,700
Oper. Programs (Fish)	10,224	10,200	10,500	10,500	18,500	18,500	16,200	17,400	21,100	21,100
Subtotal	284,771	226,700	330,000	300,885	276,100	281,000	328,700	291,900	279,400	294,400
TOTAL	685,136	627,100	697,000	667,885	597,200	602,100	671,000	693,500	741,100	772,600
Less: Tres. Borrowing	-284,771	-140,000	-330,000	-300,885	-276,100	-281,000	-328,700	-291,900	-279,400	-294,400
Plus: Cash/Misc Change	90,719	500	-42,400	-34,500	-16,100	3,000	20,700	17,000	13,700	5,900
NET PROCEEDS	491,084	487,600	324,600	332,500	305,000	324,100	363,000	418,600	475,400	484,100

STATUS OF BORROWING

	FY 1985		FY 1986		FY 1987		FY 1988	FY 1989	FY 1990	FY 1991
Prior Cumulative Borrow. Auth.		1,583,224 3/		1,662,995		1,891,595	2,079,395	2,232,895	2,294,595	2,287,395
Borrowing Authority		284,771		330,000		276,100	328,700	291,900	279,400	294,400
Less BPA Bond Amortization		-205,000		-101,400		-88,300	-175,200	-230,200	-286,600	-303,100
Cumulative Borrow. Auth. (Obs)		1,662,995		1,891,595		2,079,395	2,232,895	2,294,595	2,287,395	2,278,695

1/ The President's FY 1987 budget assumes that amounts for FY's 1988-1991 will be dropped from the budget to reflect the sale of BPA to non-federal owners.

2/ BPA's total Amortization payment of $227,900,000 in FY 1985 included $12,800,000 for Bureau of Reclamation Amortization in Associated Project Costs.

3/ This number was recalculated in the FY 1985 Rate Case. As a result, it was decreased by $47,623,000. Prior to the recalculation, the corresponding number was $1,630,847,000.

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BPA TRANSMISSION SYSTEM

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

RESOURCE PLANNING, ACQUISITION, AND OVERSIGHT $955,900,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of dollars)		
1. Load, Resource, & Acquisitions Planning	11,470	13,500	14,100
2. Generating Resources RD&D	1,096	3,100	2,700
3. Resource Purchases			
a. Pre-Pacific NW Power Act Acquisitions			
(1) Trojan	47,111	50,200	52,900
(2) WNP-1 and HGP	262,876	263,700	264,000
(3) WNP-2	372,401	386,600	362,400
(4) WNP-3	206,807	194,200	199,900
b. Pacific NW Power Act Acquisitions	4,884	9,000	11,300
4. Resource Oversight	1,002	1,400	1,800
5. Power Purchases	10,095	2,200	2,200
6. Wheeling/Other	32,585	43,400	44,600
TOTAL	950,327	967,300	955,900

Under Sections 5(b) and 6(a)(2) of the Pacific Northwest Power Act, BPA supplies the net firm power requirements of each requesting Pacific Northwest utility customer, including publicly owned systems, cooperatives, and investor-owned systems. In addition, BPA supplies power to its direct-service industrial (DSI) customers and to certain Federal agencies. BPA serves 117 municipalities, cooperatives, and public utility districts, 6 Federal agencies, and 8 privately owned utilities.

Through the Resource Planning, Acquisition, and Oversight program, BPA identifies the Administrator's load obligations, plans for the development of resources, and acquires resources as needed.

Because of its unique nature, the residential exchange which was included in this program in previous BPA budgets is now shown as a separate program.

1. Load, Resource, and Acquisitions Planning $14,100,000

This element of the program covers staff costs and related obligations for forecasting future energy and power loads, investigating potential resources, and developing programs to acquire resources. All of these planning functions are a prerequisite for BPA's implementation of the Pacific Northwest Electric Power and Conservation Planning Council's (Planning Council) Northwest Conservation and Electric Power Plan (Power Plan). The Power Plan provides guidance for meeting the electricity requirements of the Northwest in the next 20 years.

BPA's funding of forecasting activities will provide long-term (20-year) forecasts necessary to assess the Administrator's contractual load obligations for use in regional resource planning and for transmission system planning. It will also yield detailed mid- and near-term forecasts required for rate setting, interutility operations planning, and planning and design of customer service facilities.

Funds are also included for economic studies to determine the relative value of alternative resource policy, program, or project decisions. To conduct these studies BPA assembles and maintains a large data base, and uses several comprehensive planning models. These include the System Analysis Model, the Financial Analysis Model, the Decision Analysis and various issue-specific decision analysis models.

This program element also includes costs for updating BPA's Resource Strategy, an annual document containing load-resource planning information for both conservation and generating resources. (Funding for the resource projects themselves is shown in the Pacific Northwest Power Act Acquisitions element of this program and in the Conservation Program.)

Finally, engineering support for BPA organizations involved in the planning, acquisition, or oversight of generation resources is also included in this line item. Under this program element, BPA engineers evaluate or verify information on current or proposed generating projects. The level of effort in engineering support remains relatively constant. Funding for this work was included in the Generating Resources RD&D line in previous budget presentations, but is being included with the planning activities it supports in this document. It differs from RD&D in being project-specific.

2. Generating Resources RD&D $2,700,000

This element of the program covers BPA's Generation Conversion Technology Research, Development, and Demonstration Program (RD&D). In contrast to the project-specific engineering support described above, the purpose of BPA's RD&D program is to develop general information about types of resources for long range resource planning.

During the past decade, BPA and others have developed a large body of information from pilot and demonstration studies of emerging generation technologies. Over the next few years, emphasis will be on refining and analyzing that data and comparing it with BPA's projections of future commercial resource requirements. During FY 1985, BPA developed RD&D project selection criteria which will be used to screen future proposed projects. Studies currently being funded and projects being considered cover a variety of technologies including biomass cogeneration, wind, geothermal, solar, hydropower, and generation integration. BPA makes maximum use of co-funding and related work by EPRI and others.

The decrease in current estimates for RD&D from BPA's FY 1986 Congressional Budget is due to two factors: 1) an actual decrease in BPA's Generating Resources RD&D program scope during the current extended period of energy surplus; and 2) the shift of between $2 and $3 million in engineering support funding from this line item to the Load, Resource, and Acquisitions Planning program element, as described above.

3. Resource Purchases $890,500,000

a. Pre-Pacific NW Power Act Purchases $879,200,000

During the 1970's BPA, generating project owners, and certain BPA preference customers (public utilities, municipal electric systems, and cooperatives with statutory priority to power from the Federal System) entered into a series of contracts called net-billing agreements 1/ to acquire the capability of various thermal plants in the PNW.

Through these agreements, BPA has contracted to acquire all or part of the power generating capability of three nuclear power plants--WNP-1, WNP-2, and WNP-3--being constructed by the Washington Public Power Supply System (Supply System) in Washington State. BPA has acquired the entire capability of WNP-1 and WNP-2, and 70 percent of WNP-3. WNP-2 began commercial operation on December 13, 1984. WNP-1 and WNP-3 are now approximately 65 percent and 75 percent complete, and are being maintained in a preservation state pending restart of construction. Under the terms of the net-billing agreements, BPA began paying debt service and related costs for WNP-1 in July 1980, for WNP-2 in January 1977, and for WNP-3 in July 1982.

In September 1985, BPA and the four investor-owned utilities who own 30 percent of WNP-3 reached a settlement agreement concerning their suit against BPA for delaying construction of WNP-3. Damages from the suits could have exceeded $2.0 billion, if successful.

The settlement provides for an exchange of energy between BPA and the four utilities and for BPA to pay for 100 percent of WNP-3 Preservation Costs. The amount of power to be exchanged is dependent upon the performance of four surrogate nuclear plants similar in design to WNP-3. If these plants perform as expected, BPA will exchange approximately 193 average megawatts of energy to the utilities each year. In return, the utilities will provide BPA with 1) payments based on the costs of operating and maintaining the surrogate plants or WNP-3 if it is operated; 2) the opportunity to use their combustion turbines, if needed; and 3) the opportunity to complete, operate, and use their 372 megawatt share of WNP-3, if and when constructed. Before the construction of WNP-3, BPA would have to acquire the utilitites' interest in the capability of WNP-3 through a public process as provided for in the Pacific Northwest Power Act.

Final court approval of the settlement is pending.

(1) Trojan Nuclear Plant	$52,900,000

BPA acquired Eugene Water & Electric Board's (EWEB) 30 percent share of the Trojan Nuclear Plant (Trojan). Trojan is a 1,130 MW plant located near Rainier, Oregon, it became operational in May 1976. BPA acquired the Eugene Water & Electric Board's 30 percent share of Trojan through net billing agreements entered into with public and private utilities to obtain power from the Hanford Generating Project (HGP).

Costs associated with Trojan are paid to EWEB either through net-billing or cash payments. EWEB then pays its share of Trojan's annual costs to Portland General Electric, the project owner. The planned FY 1987 BPA payment of $52.9 million will cover EWEB's share of Trojan's Operation and Maintenance, nuclear fuel, capital additions, and debt service on EWEB bonds and certain other related costs. Variations from year-to-year reflect different annual fuel disbursements, and gradually escalating operating costs.

(2) Supply System	$826,300,000
(a) WNP-1 and Hanford Generating Project (HGP)	$264,000,000

The Hanford Generating Project (HGP) is a Supply System plant on the Hanford Nuclear Reservation in eastern Washington that is powered by by-product steam from DOE's adjacent N Reactor.

1/ Under net-billing, credits equal to preference customer participants' obligations to BPA for power and other services are given to those participants by BPA on their monthly power bills. The participant then pays an equal amount to the generating project for its share of the project. As a result of this process, BPA acquires the participant's shares of the projects. If a participant's net-billing capability is insufficient to pay its share of the project's annual costs, BPA makes up the difference in payments directly to the project owner.

In July 1983, new ten-year contracts went into effect providing for the Supply System's purchase of steam from DOE and for BPA and the Supply System to continue funding and operation of the HGP. Under provisions of the WNP-1 Exchange Agreement and Net Billing Agreement, the debt service of HGP is paid by the WNP-1 public agency participants through the WNP-1 Annual Budget. These agreements also provide for the WNP-1 public agency participants to pay any HGP operating costs which remain after accounting for the payments of HGP operating costs by the private utilities participating in HGP. Currently the private utilities are obligated to pay 28 percent of HGP operating costs. The public agencies participating in HGP exchange their rights to HGP energy for firm power equal in value delivered from BPA. Although HGP annual budgets are reviewed and approved separately each year by BPA, the public agencies' share of the operating costs for HGP do not show as a separate line item in BPA budgets.

The FY 1987 WNP-1 budget contains HGP debt service and the public agencies' share of HGP operating costs, in addition to WNP-1 debt service and related costs. The two investor-owned utilities share of operating costs is paid through trust fund arrangements. The Reimbursable section of this document contains these costs.

In 1982, the Supply System Board of Directors authorized an extended construction delay on WNP-1, a 1,250 MW pressurized water reactor plant located near Richland, Washington, for up to 5 years because of declining load forecasts and financing difficulties. The Supply System has paid cash requirements for the construction delay program with funds from bond sales made prior to the deferral.

BPA's FY 1986 Congressional Budget assumed that WNP-1 construction would resume in FY 1989. BPA's Draft 1986 Resource Strategy reviewed the anticipated regional loads and least cost resources available to meet those loads.

The Draft Strategy concluded that the probability of there being a need to restart construction of WNP-1 through FY 1991 was not large enough to warrant the inclusion of constuction restart costs in the out year estimates of BPA's FY 1987 Budget. The decrease in the FY 1989 through FY 1991 budget estimates reflects the decrease in debt service requirements associated with deferring construction beyond FY 1991. This assumption, as well as the appropriate level of preservation activity to maintain WNP-1, will be addressed in a subsequent policy study process to begin in early 1986.

(b) WNP-2 .... $362,400,000

WNP-2, an 1,100 MW boiling water reactor plant located near Richland, Washington, began commercial operation in December 1984. FY 1985 and FY 1986 contain funding for WNP-2 debt service and related costs, operating costs, and construction completion costs. In FY 1987 the cost of completing final deferred construction items is expected to be offset by recoveries from contract closeouts and proceeds of salvage sales.

The FY 1987 estimate also includes $1.8 million for an insurance premium on Nuclear Electric Insurance Limited excess nuclear property insurance for damage over $500 million on WNP-2 (NEIL II), which will be paid directly by BPA rather than through the Supply System budget. Although it is not included as a budgeted obligation, BPA must also be prepared to pay a retrospective premium adjustment of approximately $10 million in the event that one of the participating utilities in NEIL II has an accident with property damage in excess of $500 million.

(c) WNP-3 .... $199,900,000

WNP-3 is a 1,240 MW pressurized water reactor plant located near Satsop in western Washington. Like WNP-1, it is currently in a construction preservation state necessitated by the unavailability of financing and delay in need for its power. It is anticipated that construction will not resume until after FY 1991.

Obligations for WNP-3 include 100 percent of the costs associated with preservation as well as debt service and related costs for outstanding bonds. The FY 1987 estimated obligations for WNP-3 are higher than those forecast in BPA's FY 1986 Congressional Budget, due to higher preservation costs attributable to the settlement agreement reached with the four investor-owned utilities. The decrease in the FY 1988 through FY 1991 budget estimates from the FY 1986 Congressional Budget reflects the decrease in debt service requirements associated with deferring construction beyond FY 1991. Increased preservation costs have been provided in the budget for fiscal years 1988 through 1991 to preserve the plant during this period. The assumptions regarding construction restart and preservation expenditure levels will be reviewed in a policy study process scheduled to begin in early 1986.

b. Pacific Northwest Power Act Acquisitions $11,300,000

The current electric power forecast indicates that, under medium load conditions, the region will have a substantial surplus until the mid to late 1990's. However, because there is considerable uncertainty that the region will actually experience such load conditions, BPA's Resource Strategy provides for insurance against higher-than-anticipated loads.

Consistent with that Strategy, BPA is developing programs which provide flexibility for meeting unexpectedly rapid load growth without prematurely committing BPA to large-scale acquisition programs. These programs, described below, account for the increases in this line item between FY 1985 and FY 1986.

(1) Options $6,000,000

By purchasing an option to acquire a resource at a later date, BPA obtains the flexibility to decide at some point in the future whether a specific generating resource should be acquired or constructed. BPA's purchase of options pays for all pre-construction costs of these specific resources. In exchange for those payments, BPA acquires the right to control the start of construction and the construction schedule of a project. BPA will purchase options on projects which have already been constructed or can be constructed so as to be available when needed. A successful options program will help ensure that BPA will be able to meet load obligations beyond the medium load forecast, without committing the agency prematurely to costly construction programs or outright acquisitions.

A limited hydro options program was implemented during FY 1985. BPA solicited projects and will negotiate options contracts with sponsors of various categories of hydro projects. This budget provides $2,300,000 for funding the costs of these hydro options during FY 1987.

BPA is also providing for purchase of cogeneration options as part of this effort to plan under a variety of uncertain conditions. Up to 20 average MW of options on cogeneration projects at a cost of $1,000,000 is provided for FY 1987. These options will assist potential cogenerators who are making plant modifications to make the incremental investment necessary to permit addition of generation equipment at a later date. The initial investment is minimized since the generating equipment is not purchased until the option is exercised.

This portion of the budget also provides $2,700,000 for options on other generating projects which are cost-effective in the long run and would be lost to the region if they were not acquired by BPA during the fiscal year.

(2) Resources Under Contract $5,300,000

BPA has entered into one contract to acquire a resource under the Pacific Northwest Power Act, the City of Idaho Falls Hydroelectric Project. BPA is purchasing energy from three units at the City's 27 MW bulb-turbine hydroelectric project. No additional contracts are planned as part of the FY 1987 budget.

4. Resource Oversight $1,800,000

This portion of the program covers BPA's in-house and contract costs for overseeing the financing, budget, fuels management, power marketing, and construction of the Supply System Projects, Trojan, and acquisitions made under the Pacific Northwest Power Act.

BPA oversight of the Supply System projects is consolidated in a Program Office located at Supply System headquarters in Richland, Washington. The Program Office is the focal point for oversight of the Supply System projects and the primary channel of communication and coordination between BPA and the Supply System. The Program Office is supported by staff at Bonneville headquarters in Portland in such areas as litigation, financing, ratemaking, and special studies and analyses.

A portion of the funding for oversight covers work by staff in BPA's Portland headquarters for overseeing the operation of the Idaho Falls Hydroelectric Project and the net-billed portion of the Trojan Nuclear Plant.

5. Power Purchases $2,200,000

This program element is for BPA purchase of power for resale to other parties or for the efficient operation of the power system. Variations in the terms of the Service and Exchange Agreements, BPA rates, and river regulation affect the amounts budgeted for Power Purchases. All disbursements are more than offset by revenues when the power is resold.

6. Wheeling/Other $44,600,000

This portion of the budget covers five types of costs. First, in instances where Federal transmission is not available, BPA pays utilities for transmitting Federal power over non-Federal facilities. Second, BPA pays various other charges associated with benefits accruing to downstream projects resulting from coordinated operation of Federal and non-Federal generating projects. Third, BPA pays other parties to store energy in their reservoirs or in the fuel supply for thermal powerplants. Fourth, BPA will pay its customers for maintaining BPA's facilities when it is in BPA's economic interest to do so. Finally, BPA will lease utilities' facilities when those facilities are required for delivering Federal power.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

RESIDENTIAL EXCHANGE $1,109,600,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(In thousands of dollars)		
1. Residential Purchase and Sale Agreement (RPSA)	1,007,526	1,082,200	1,107,600
2. Exchange Transmission Credit Agreement (ETCA)	1,312	2,000	2,000
TOTAL	1,008,838	1,084,200	1,109,600

The Pacific Northwest Power Act created the residential exchange program to extend the benefits of low-cost Federal power to the residential and small farm customers of investor-owned and publicly-owned utilities. Although it appears to be primarily a power transaction and is so treated in BPA's rate proceedings, the residential exchange is not a power transaction in the conventional sense, but rather a subsidy program. In effect, the program acts to lower the rates paid by the residential and small farm customers of exchanging utilities. No power is transferred to or from BPA.

The first, and by far the largest, element of the program is the Residential Purchase and Sale Agreement (RPSA). The paper transaction operates as follows: BPA must acquire certain amounts of power offered for sale by Pacific Northwest electric utilities. That power is acquired at each utility's "average system cost", which includes both generation and transmission costs. In exchange, BPA must sell an equivalent amount of electric power to the participating utilities for resale to the utilities' residential and small farm customers within the region. The power is sold at BPA's Priority Firm (PF) Rate, which is generally lower than the utilities' average system cost. Since the same amount of power is involved, the "sale" of power is an accounting procedure used to determine the amount of subsidy to be received by customers of exchanging utilities. In practice, only dollars are exchanged.

The Exchange Transmission Credit Agreement (ETCA), the second and much smaller component of the residential exchange, is available to BPA's public utility and cooperative customers and limits their payments to the cost of their transmission facilities. The payments, however, cannot be greater than the amount that the utility would receive if it had participated in the RPSA. ETCA costs amount to approximately $2 million of the total $1,109.6 million for residential exchange in FY 1987.

During FY 1986, 25 utilities will participate in the Residential Purchase and Sale Agreement program. Between 7 and 12 utilities are projected to participate in the ETCA during FY 1986. Comparable levels of participation are expected in FY 1987. The FY 1986 and FY 1987 costs of the RPSA are derived from the new methodology for calculating the utilities' average system costs. After July 1, 1985, the net cost of the program (the difference between the utilities' average system cost and BPA's PF Rate) will be recovered from all BPA's customers. The net cost, or subsidy, in FY 1986 and FY 1987 is estimated at $217 million and $228.6 million, respectively.

Increases from year to year in exchange costs are due to combinations of four factors: increases in utilities' average system costs, load growth, new utilities entering the exchange, and the level of BPA's own rates.

Although previously included in BPA budgets as part of the Resource Planning, Acquisition, and Oversight Program, the residential exchange is displayed for the first time in this document as a separate program. It has been broken out in this presentation because of its magnitude and the fact that it does not serve the unifying program purpose of providing resources to meet the Administrator's load obligation that the rest of the elements in the Resource Planning, Acquisition, and Oversight Program serve.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

ENERGY CONSERVATION $117,500,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of dollars)		
1. Residential Programs	63,585	59,200	56,200
2. Commercial Programs	28,990	24,100	32,200
3. Industrial Programs	692	9,200	15,100
4. Agricultural Programs	2,291	200	2,700
5. Public Agencies and Customers	11,534	14,300	25,200
6. Program Development	28,382	8,700	7,800
SUBTOTAL, Planned Conservation	139,474	115,700	139,200
(Undistributed Reduction) 1/	--	-8,900	-21,700
TOTAL BPA FUNDED CONSERVATION	139,474	106,800	117,500

The Pacific Northwest Power Act requires BPA to treat conservation as the region's highest priority electric power resource in planning to meet the Administrator's load-serving obligations. This program reflects the costs associated with meeting that objective.

In formulating the FY 1987 Conservation Program, BPA reexamined conservation program levels in the context of a newly revised load forecast and current levels of conservation program participation. BPA also reexamined the Conservation Program in light of the emphasis placed on pilot, demonstration and evaluation efforts called for by the Pacific Northwest Electric Power and Conservation Planning Council's (Council) Northwest Conservation and Electric Power Plan (Power Plan), including the need to moderate near-term rate impacts.

This reassessment resulted in a shift of emphasis from near-term energy and capacity acquisition efforts to development of a flexible capability to acquire savings in the future when they are needed. While the program that is proposed under this concept will result in some short-term savings, the main intent is to build capability on the part of BPA, its utility customers and government agencies which can be implemented on short notice.

This has resulted in reductions in the residential programs from $67.6 million in FY 1985 to $56.2 million in FY 1987. Over the same period, funding for commercial and industrial programs will increase by $17.6 million to investigate how the high savings potential of these areas might be used in the future.

The $10.9 million increase over FY 1987 for the Public Agencies and Customers subprogram is almost entirely for initial implementation of Model Conservation Standards (MCS) in

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1/ Undistributed Reduction: Funding adjustment to scheduled program provides for program reductions, and slippages due to unidentified delays. Changing regional circumstances may require adjustments within the funding level between subprograms or programs.

new structures. MCS has a high priority because of the very cost-effective and long term energy savings that result due to the life of the structures. New buildings also represent lost opportunities if conservation is not incorporated in the initial construction.

Overall, the reassessment results in a planned Conservation budget level of $139.2 million in FY 1987. This planned budget level is supplemented by another $23.9 million from non-BPA sources for a total Conservation Program in the region of $163.1 million. BPA also expects additional investments (as yet unquantified) will indirectly result from its conservation activities.

However, BPA expects to fund the Conservation Program at $117.5 million (see footnote on previous page). The table at the end of this narrative describing the major conservation categories summarizes the planned program levels, including both Federal and non-Federal contributions.

1. Residential Programs $56,200,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(In thousands of dollars)		
a. Residential Weatherization	59,950	54,200	48,500
b. Solar/Heat Pump Water Heating	2,337	300	1,900
c. Appliance Efficiency	754	1,000	900
d. Residential Promotion	4,544	3,700	4,900
TOTAL	67,585	59,200	56,200

The purpose of the Residential Programs is to reduce loads in the residential sector by increasing the energy efficiency of residential structures and appliances. Program activities include energy efficiency improvements in existing housing, encouraged use of solar and heat pump technologies, appliance efficiency improvements, and a marketing effort to promote energy conservation in new homes.

a. Residential Weatherization $48,500,000

Residential Weatherization provides for retrofitting the existing electrically heated housing stock. Insulation and such house-tightening measures as storm windows, caulking, and weatherstripping are included. BPA will continue to make a special effort to increase participation of low-income electricity consumers, through utilities and States. BPA's funding level of $48.5 million for this program reflects a $5.7 million reduction from FY 1986 levels. It includes incentive payments to enable BPA's utility customers to separately finance an additional $8 million of weatherization in their service areas. The utilities will also contribute through cost-sharing about $3.9 million for weatherizing homes in their service areas. Weatherization provides the equivalent of 12.3 average megawatts at 26 mills/kWh.

b. Solar/Heat Pump Water Heating $1,900,000

The Solar and Heat Pump Water Heating project is designed to test the effectiveness of marketing and financial incentives as a method of encouraging residential electricity users to install either solar or heat pump water heating devices. BPA has selected 11 utilities to test a low promotion level of effort versus a high promotion level to determine the most cost effective delivery mechanism and incentive level for acquiring energy savings in this area of the residential sector. The consumer contribution to this program through purchase of units is expected to be $3.0 million.

c. Appliance Efficiency $900,000

The Appliance Efficiency program provides information to consumers on the relative energy efficiency of major home appliances. In addition, BPA intends to conduct field tests to assess the effect of offering financial incentives for energy efficient appliances on energy savings, costs and penetration rates.

d. Residential Promotion $4,900,000

The major component of this program is Super Good Cents, which is a promotion and certification program for new housing meeting the Council's Model Conservation Standards. It is implemented through BPA's participating customer utilities.

Other program components are (1) the promotion of homes that meet the Federal (HUD) Manufactured Home Construction and Safety Standards and the thermal levels of the Council's Model Conservation Standards, (2) test financial mechanism's through lending institutions, (3) support from marketing contractors, and (4) an energy education program for students and teachers throughout the four state region.

2. Commercial Programs $32,200,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of dollars)		
a. Commercial Conservation	26,946	22,100	30,100
b. Street & Area Lighting	2,044	2,000	2,100
TOTAL	28,990	24,100	32,200

This planned level is a $8.1 million increase from the FY 1986 funding level, mostly due to increased activity in the Commercial Retrofit Program for Purchase of Energy Savings (PES) and the Commercial Building Incentives Program.

a. Commercial Conservation $30,100,000

The major components of Commercial Conservation are the Retrofit Program, the Institutional Buildings Program, the New Commercial Buildings program and the Commercial Education and Technical Assistance Program.

The Commercial Retrofit Program is designed to use a full range of financial incentives and delivery mechanisms to achieve conservation measures in an economic and geographic cross-section of commercial buildings. BPA's Purchase of Energy Savings approach encourages the installation of energy conservation measures in commercial buildings through payments to sponsors from BPA based on energy savings. BPA is also testing a utility operated pilot program which will stimulate conservation in commercial buildings by offering an investment incentive or rebates to building owners. A number of utilities are arranging financing with local lending institutions to provide capital to building owners for the installation of conservation measures. The program will be tested during FY 1986, 1987, and 1988. If the approach is successful the program may continue to operate at minimum levels during FY 1989-1991 to maintain utility capability.

The Institutional Buildings Program provides funding for energy audits, technical analyses, and qualifying retrofit conservation projects in institutional buildings. The program is currently implemented through the four Northwest state governments. Funding covers state administrative costs, building energy auditor training, technical studies, and electric energy savings achieved through retrofits.

The New Commercial Building Incentives Program would use cost-sharing incentives to cover a portion of the costs of conservation measures that substantially exceed the proposed Standards. Specific payments depend on capacity and energy savings achieved in a particular application. These activities support the Council's proposed Model Conservation Standards for the commercial sector.

Technical assistance and education efforts are a critical part of BPA's overall commercial sector conservation strategy. These efforts complement commercial conservation programs by increasing the quality of the work performed and ensuring the reliability of the energy savings. A program to provide technical training to operators of complex commercial buildings is in the design stages. Significant energy savings are available from low cost measures that maintain or restore a building's energy efficiency to optimum efficiency levels. In addition, this training is essential to insure that BPA investments in energy efficiency measures and property are maintained over their useful life. A significant share of the regional commercial load is found in chain stores and franchises. BPA is currently investigating the decision-making structure of the top 20 chains in the region, and in FY 1987 will provide technical assistance for conducting energy analysis, and support a portion of the cost of retrofitting a demonstration store in each chain or franchise.

The energy savings to be acquired in the Commercial Programs during FY 1987 is 9.1 average megawatts at 18 mills/kWh.

b. Street and Area Lighting $2,100,000

The Street and Area Lighting Program provides funds for the replacement of outdoor lighting fixtures and associated hardware with more energy-efficient lamps. BPA reimburses participating utilities and States for labor, administrative, and materials costs (up to a designated limit) for replacing fixtures and bulbs during normal maintenance. BPA's customer contribution through cost-sharing is $77 thousand. This program is scheduled to end with the FY 1987 funding. The energy savings to be acquired in FY 1987 is 1.9 average megawatts at 13 mills/kWh.

3. Industrial Programs $15,100,000

The Industrial Programs are planned to operate at a $5.9 million increase over FY 1986, primarily due to increased efforts to acquire site-specific conservation projects in the aluminum and other industries.

The Industrial Sector represents the largest and most diverse electrical energy usage in the Region. Because of this, improvements directed to industrial end-uses offer the potential for significant energy savings. Options for various industrial programs have been under consideration for several years. The three components of this activity are the Industrial Test Project, Site-specific projects and the Education and Technical Assistance Program.

BPA has implemented the Industrial Test Project (ITP) to determine if standards of electrical energy use and savings can be designed and applied to selected Standard Industrial Classification (SIC) codes. Through a competitive bidding process, BPA selected five contractors to conduct 25 energy analyses in three industrial groups: foods and food processing (SIC-20); wood products (SIC-24); and pulp and paper (SIC-26). The experience gained will help BPA adopt standards for estimating that could be applied within the industry, obtain a realistic assessment of analysis costs, and examine industries energy conservation decisionmaking characteristics, criteria and marketing attitudes.

The Industrial Site-Specific Project is an annual solicitation to encourage others outside BPA to design and carry out site-specific conservation projects. The program has evolved from the 1984 and 1985 sponsor-designed solicitations, with three of the seven contracts awarded in the 1984 round going to industrial projects. The sponsor-designed solicitation allows them to identify site-specific activities to conserve energy and seek BPA's financial support to carry out the projects.

BPA is developing a comprehensive Education and Technical Assistance Program for the Industrial Sector. This effort is being designed to reach different audiences on a variety of subjects through several media. Audiences include building owners, designers, developers, architects, engineers, energy service companies, utilities, banks and manufacturing representatives.

4. Agricultural Programs $2,700,000

Funding for this program is planned to increase $2.5 million over the FY 1986 level, through expansion of the Irrigated Agriculture program from the pilot phase into a regional acquisition program.

Farming is capital-intensive, and farmers have historically invested first in land and second in field equipment directly related to cultivation and harvesting. Improvements in irrigation equipment have ranked low in their priorities. Yet, acquired energy savings in this sector are very cost effective.

The Irrigated Agriculture Program involves change-over to low pressure irrigation equipment and changes in water scheduling that will shift energy usage to earlier in the year, reduce energy consumption, and shave peak loads. This program was developed and implemented in cooperation with utilities, State and Federal agricultural agencies, and the land-grant universities. The pilot phase of this activity was completed with FY 1985 funds. In FY 1986, various private financing mechanisms are being explored. This program will move into a full regional acquisition program in FY 1987, with utilities contributing $192 thousand through cost-sharing. This program provides the equivalent savings of 1.7 average megawatts at 15 mills/kWh.

5. Public Agencies and Customers $25,200,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of dollars)		
a. Model Conservation Standards/ State and Local Gov't Asst.	11,181	14,300	25,200
b. Customer System Efficiency	353	0	0
TOTAL	11,534	14,300	25,200

The proposal represents a planned increase of $10.9 million over FY 1986. The majority of this increase is for support of the Council's Model Conservation Standards implementation. Another significant part of the increase is the start of the Residential Construction Demonstration Project.

The purpose of these programs is to encourage BPA's customers and State and local governments to implement energy conservation measures and programs throughout the region. The only program funded in FY 1987 is the Model Conservation Standards/State & Local Government support programs. That Program involves three major categories of activities: 1) Model Conservation Standards Implementation Support, 2) State & Local Government Assistance, and 3) Demonstration & Technical Support.

As part of the Model Conservation Standards effort, the Model Conservation Standards Implementation Support subprogram involves direct BPA financial assistance for the adoption/enforcement of the MCS, and incentives for builders constructing homes to the MCS levels of energy efficiency. The Code Adoption Demonstration Program (CADP) currently provides financial assistance to local jurisdictions who adopt the MCS as a building code before a January 1, 1986, deadline. The program also provides builder incentives to cover a portion of the incremental costs of building to the standard. Based on current Council deliberations, it appears likely that the mandatory adoption date of January 1, 1986, for the MCS will be delayed until January 1, 1987 or 1989. With such a delay, the CADP will be extended to allow participating jurisdictions to continue receiving support and will open up the program for more early adopters between now and the adoption date. This is consistent with the findings in other parts of the nation that "codes follow practice."

The Model Conservation Standards Implementation Program (MCSIP) is intended to provide financial assistance to those jurisdictions who adopt and enforce the MCS after the mandatory adoption date. The program reimburses jurisdictions for their incremental costs of inspecting for compliance to the MCS.

The New Home Incentive Program provides direct financial incentives to builders/homeowners for the construction of new residential structures at MCS levels of energy efficiency. The program would be designed to stimulate a rapid increase in energy-efficient building practices.

State and Local Government Assistance involves direct financial assistance to the Northwest States and local governments for supporting MCS adoption and completing other conservation activities. State Technical Assistance Program provides financial support to the States of Oregon, Washington, Idaho and Montana to carry out energy conservation education, training and technical assistance for consumers, the building construction industry, small businesses, farmers, local governments, and others. The Local Government Financial Assistance Program provides financial grants to local governments for specific energy conservation activities.

The Demonstration and Technical Support Project involves two demonstration projects and several small contracts involving MCS, MCS compliance, training and oversight, environmental studies, and other technical support activities. The Residential Standards Demonstration Program (RSDP) involves the construction of 450 homes to the MCS for the purpose of comparing their cost and thermal performance to typical new homes. It also provides an opportunity for builders to construct homes meeting the MCS and to understand better the practical realities of building homes in this manner.

The Residential Construction Demonstration Project is a new demonstration project designed to test innovative building features and/or techniques for the purposes of continuing MCS construction experiences and advancing the state of the art in building practice. Builders would be eligible to receive an incentive for the construction of a new MCS home as long as they incorporate one or more new features or techniques in the construction of the home.

The States will contribute $544 thousand through cost-sharing, and homeowners will spend about $8.1 million in incremental costs for homes that meet the MCS.

6. Program Development $7,800,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of dollars)		
a. Hood River Project	6,292	1,200	100
b. Assessment and Evaluation	20,333	3,900	4,100
c. Conservation RD&D	1,757	3,300	3,300
d. Engineering Technical Support	0	300	300
TOTAL	28,382	8,700	7,800

a. Hood River Project $100,000

The $100 thousand request in this area reflects the winding down and completion of the Hood River Project. This major case study of marketing techniques and an aggressive residential retrofit effort initiated in FY 1983 will provide a test of the effects and limits of conservation achievement in existing residential buildings.

b. Assessment and Evaluation $4,100,000

The Assessment and Evaluation activity includes: (1) investigation, development, and implementation of external financing mechanisms and approaches in order to supplement BPA's borrowing authority; (2) evaluation of conservation programs to ensure effective and economic program efforts; (3) assessments of the conservation potential available in the region as well as factors that influence implementation of conservation measures; and (4) the development of data and models to analyze issues of importance to conservation resource development such as incentive design, consumer response, and forecasts of energy savings.

c. Conservation Research & Development $3,300,000

The Conservation RD&D projects include actions designed to verify existing Technologies, and to develop new technologies.

The Council's Plan specifically mentions demonstration projects in the Agricultural sector. Five projects are proposed for FY 1986-1987, including Deficit Irrigation, Basin Tillage, Low Energy Precision Irrigation, and Current Status of Flow Meters. In the commercial sector projects are proposed in the areas of lighting, supermarket refrigeration and ventilation air tempering. Projects concerning aluminum smelting, lumber and wood products and electric motor controllers are planned for the industrial sector. Residential sector projects include indoor air quality, appliance efficiencies, and building shell improvement products and techniques. There are also projects for improving efficiencies in the utility sector.

d. Engineering Technical Support for Conservation $300,000

This program provides for engineering support for the Conservation programs. Activities include development of identified technical data, investigations, reports, evaluations and product approvals required to support program design or operating programs.

SUMMARY OF CONSERVATION PROGRAM
(Including BPA and Non-Federal Funding)
(in thousands of dollars)

	FY 1985		FY 1986		FY 1987	
	Actual Oblig.	Estimated Energy Savings*	Estimated Budget Require.	Estimated Energy Savings*	Estimated Budget Require.	Estimated Energy Savings*
RESIDENTIAL PROGRAMS						
Residential Weatherization	59,950	87.4	54,200	99.6	48,500	109.8
Solar/Heat Pump Water Heating	2,337	--	300	—	1900	--
Appliance Efficiency Program	754	—	1,000	—	900	—
Residential Promotion	4,544	—	3,700	—	4,900	—
Non-BPA Funding	0	—	15,000	3.1	14,900	5.9
Subtotal	67,585	87.4	74,200	102.7	70,200	114.9
COMMERCIAL PROGRAMS						
Commercial Conservation	26,946	21.8	22,100	26.1	30,100	35.2
Street and Area Lighting	2,044	10.7	2,000	12.5	2,100	14.4
Non-BPA Funding	0	—	100	—	100	—
Subtotal	28,990	32.8	24,200	38.6	32,300	49.6
INDUSTRIAL PROGRAMS						
Industrial Conservation	692	0.3	9,200	1.8	15,100	5.1
AGRICULTURAL PROGRAMS						
Irrigated Agriculture	2,291	3.3	200	3.4	2,700	5.0
Non-BPA Funding	0	—	0	—	200	0.1
Subtotal	2,291	3.3	200	3.4	2,900	5.1
PUBLIC AGENCIES & CUSTOMERS						
MCS/State & Local Gov't. Sup.	11,181	—	14,300	--	25,200	—
Customer System Efficiency	353	--	0	--	0	—
Non-BPA Funding	0	—	4,000	—	8,700	--
Subtotal	11,534	--	18,300	--	33,900	—
PROGRAM DEVELOPMENT						
Hood River Project	6,292	3.9	1,200	3.9	100	3.9
Assessment & Evaluation	20,333	—	3,900	--	4,100	—
Conservation RD&D	1,757	—	3,300	—	3,300	—
Engr. Technical Support	0	--	300	—	300	—
Subtotal	28,382	3.9	8,700	3.9	7,800	3.9
TOTAL CONSERVATION PROGRAM	139,474	127.4	134,800	150.3	163,100	178.6
Less: NON-BPA FUNDING	0		-19,100		-23,900	
TOTAL BPA PLANNED CONSERVATION	139,474		115,700		139,200	
(Undistributed Reduction)	—		-8,900		-21,700	
TOTAL BPA FUNDING	139,474		106,800		117,500	

* Energy savings are shown in annual average megawatts, cumulative as of the end of each year. The savings shown in FY 1987 include the savings achieved as a result of expenditures during FY 1982 - FY 1987.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

SYSTEM PLANNING AND CONSTRUCTION $187,100,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of dollars)		
System Planning and Construction			
1. Facilities Underway (Carryover)	136,182	256,215	57,000
2. Proposed System Additions for FY 1987	--	--	120,900
3. Revenue Funded Construction Expenses	11,191	15,900	16,300
SUBTOTAL, Planned Construction Program	147,373	272,115	194,200
(Undistributed Reduction) 1/	--	-22,215	-7,100
TOTAL	147,373	249,900	187,100

This program provides budget authority and resources for planning and construction of new or improved transmission lines, substations, control systems, and general facilities for the transmission system of the Federal Columbia River Power System (FCRPS) in the Pacific Northwest.

Under its legislative provisions, BPA constructs improvements, betterments, and additions to and replacements of the transmission system required to:

- integrate and transmit the electric power from existing or additional Federal or non-Federal generating units;
- provide service to BPA's customers;
- provide interregional transmission facilities; or
- maintain the electrical stability and electrical reliability of the Federal system.

To determine BPA's system planning and construction requirements, BPA in conjunction with its customers and other regional utilities prepares load forecasts for each substation on the transmission system. The electrical operation of the system is then modeled to identify reliability and efficiency problems and to determine system requirements. Subsequent engineering analysis produces a solution which will meet the reliability criteria of BPA and the interconnected western U.S. utilities (Western Systems Coordinating Council), and prudent utility practice and industry standards. This engineering solution results in BPA budget items for main grid, area, and customer service transmission system additions.

In FY 1985, almost 80 percent of the construction program has been performed by contract with private sector firms. The budget for FY 1986 and FY 1987 continues this approximate ratio of force account to contract construction. The higher level of

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1/ Undistributed Reduction: Funding adjustment to scheduled program provides for program reductions, and slippages due to unidentified delays. Changing regional circumstances may require adjustments within the funding level between subprograms or programs.

funding in FY 1986 compared with the level of funding FY 1985 and FY 1987 results from award of the DC Terminal Expansion turnkey contract in early FY 1986. The contract was originally scheduled for award in FY 1985.

Key objectives of the program in FY 1987 are to: (1) initiate system reinforcements of the Federal grid to support construction of transmission facilities in the Pacific Southwest for a Third AC intertie of approximately 1600 MW capacity; (2) acquire a second host processor for the main frame computer for continued expansion through 1990; (3) acquire office systems that accommodate BPA's move into the new Federal Building East; (4) replace the Dittmer Control Center's 16-year-old dispatch and power scheduling system (RODS), (5) initiate phase three replacement of BPA's microwave system equipment; (6) complete the third phase of a 15-year program to replace polychlorinated biphenyl (PCB) contaminated electrical equipment on the BPA system; and (7) continue high priority replacement of overloaded power circuit breakers and other worn out or damaged electrical equipment on the transmission system.

As tabulated above, the System Planning and Construction Program includes both capital investments and expense activities. Capital construction includes main grid, area and customer service transmission system additions, general system facilities, and system electric facilities. For FY 1987, BPA's budget includes borrowing authority of $170.8 million for capital construction. BPA's construction expense activities include financial participation in EPRI, BPA's own transmission research and development (R&D) efforts, and impact aid to local governments. BPA's transmission R&D and EPRI activities will require revenue-funding of $16.3 million in FY 1987. BPA anticipates no funding requirement for impact aid in FY 1987.

1. Facilities Underway ("carryover" construction) $57,000,000

The FY 1987 carryover construction program includes $57.0 million, which is approximately one-third percent of the scheduled capital construction for the fiscal year.

The reduced funding level of carryover construction in FY 1987 compared to FY 1986 reflects the completion of a large new start main grid, programs initiated in the early 1980's; reduced level of customer service new start requirements due to the region's continued energy surplus and reduced load growth rates; and increased importance of equipment upgrade and replacement as the system ages and electrical equipment becomes obsolete, worn out or inadequate.

Carryover main grid and area reinforcements are underway to increase transmission capacity, ensure voltage levels and provide for reliability of service and stability of system operations for customers. In FY 1986, BPA will add 509 miles of line, retire 101 miles of transmission, and add six new substations, retire two, and add and retire major equipment at 13 substations. In FY 1987, BPA will add 44 miles of line and retire 22 miles of line. In addition, one new substation will be added, three retired, and major equipment changed at seven substations.

Carryover construction includes high priority funding required to upgrade, replace, and extend power system control (PSC) and general and system electrical facilities and equipment to meet reliability and stability concerns, improve revenues and upgrade system operations and dispatch. Essential general structures underway include four flammable liquid/herbicide storage facilities, six oil-spill containment facilities, and six maintenance facility additions and extensions.

Prominent power system control items underway include replacement of the dispatch and scheduling (RODS) system at the Dittmer Control center; phase four of a revenue metering system at 175 locations; phase one upgrade of the stability control system; and phase two microwave communications equipment replacement.

System electric facilities underway include power circuit breaker and transformer additions and replacements, wood pole replacements for lower voltage facilities, and replacement of polychlorinated biphenyl (PCB) contaminated electrical equipment. These replacement items are growing in importance because of additional environmental laws and regulations, the growing age of the power system, obsolescence of electrical and electronic equipment, and increased reliance on control facilities to effectively operate the Pacific Northwest power system and its interregional interties.

2. Proposed System Additions $120,900,000

The Proposed System Addition ("new start") requirement for FY 1987 is $120.9 million, compared with FY 1986's new start program funding of $79.1 million. These additions include three main grid new starts items, one area service item, and increased requirements for replacement and upgrade of aging, worn out and damaged power system equipment. The funding level of the FY 1987 new start program reflects a continuation of the FY 1986 new start replacement workload level, plus the addition of intertie requirements and replacement of PCB contaminated equipment.

a. Main Grid $40,473,000

The FY 1987 construction program includes no "major transmission facilities" which require specific approval of Congress in accordance with the Federal Columbia River Transmission System Act. There are, however, three main grid new starts for FY 1987.

	Total Cost	FY 1987	Required to Complete
	(In thousands of dollars)		
(1) Eugene-Medford 500-kV Interconnection (Item 102)	9,346	4,643	4,703

BPA will design and construct a 2-mile 500-kV double circuit Alvey-Spencer Transmission line and add two new circuit breakers at Alvey Substation. These facilities will connect a 60-mile 500-kV line being built by Pacific Power and Light Company (PP&L) to the BPA main grid to serve PP&L loads in southern Oregon and support expansion of the AC intertie between the Pacific Northwest and the Pacific Southwest.

Scheduled Energization .... October 1988

	Total Cost	FY 1987	Required to Complete
	(In thousands of dollars)		
(2) Third AC Intertie System Reinforcement (Item 103)	65,818	32,471	33,347

The addition of the Third AC Intertie between the Pacific Northwest and Northern California increases interregional AC Intertie capacity by 1600 megawatts from 3200 megawatts to a total of 4800 megawatts. Integration of the Third AC Intertie to California requires concerted action by all facility owners. The intent of the Northwest Intertie facility owners is to undertake construction of facility modifications and/or new construction necessary to achieve the Third AC.

A short transmission line from Southern Oregon to the California/Oregon border will be constructed. Construction of the new Intertie in the Southwest will also require various system reinforcements in the Northwest to maintain system reliability. BPA and other Northwest intertie facility owners will add or upgrade Northwest electric facilities, including power circuit breakers, series and shunt capacitors, and related equipment at numerous major substations; loop several 500-kV transmission lines into key substations, and upgrade related power system control and dispatch facilities to provide system stability for this Intertie expansion.

The current plan is to make 800 megawatts of the 1600 megawatts of increased Intertie capacity available for use by Pacific Northwest regional utilities. The Northwest owners are investigating terms and conditions for such a subscription. BPA and other Pacific Norhtwest and Pacific Southwest utility interests have been negotiating marketing and other commercial and utility arrangements for the Third AC since early 1985. BPA budget provison for construction allows BPA to be full participant in the Intertie process. If BPA and other facility owners are able to make satisfactory arrangements for use of the Intertie by other Northwest utilities through subscription, facilities related to the Third AC line may be funded by non-Federal participants. Actual construction of Third AC related facilities in the Pacific Northwest will begin only after BPA and other Pacific Northwest Intertie users have determined that this power marketing project is economically feasible.

Scheduled Energization .... May 1990

	Total Cost	FY 1987	Required to Complete
	(In thousands of dollars)		
(3) System Reactive Facilities (Item 150)	5,232	3,359	1,873

The addition of 200,000 kVA reactive capacity to the main transmission grid is part of a continuing program to: 1) Raise the general voltage level of receiver-end substations; 2) Increase the power transfer capability of the system and decrease system losses; and 3) Provide voltage control under normal load variations and system emergency conditions.

b. Area, Customer, and Industrial Services $6,295,000

The FY 1987 Area, Customer, and Industrial Service funding is provided to solve specific area problems or provide increased capacity for customers. Although the region continues to experience low load growth, individual BPA customers and localized service areas experience increased peak load growth or unacceptable voltage levels. The FY 1987 program includes one area service item and requirements for miscellaneous new customer and industrial service facilities. The fiscal requirements of this year's new start program is approximately the same as FY 1986, reflecting the relatively constant growth in power demand by these facilities.

	Total Cost	FY 1987	Required to Complete
	(In thousands of dollars)		
(1) Fossil Area Reinforcement (Item 705)	5,272	2,335	2,937

BPA will construct a 42-mile, 115-kV transmission line between Maupin Substation and its Rajneeshpuram Tap, and replace related 69-kV facilities with 115-kV facilities.

This action is required to provide increased transmission capacity and voltage support to this growing load in central Oregon.

Scheduled Energization .... October 1988

	Total Cost	FY 1987	Required to Complete
	(In thousands of dollars)		
(2) Customer and Industrial Services (Items 770 and 112)	6,263	3,960	2,303

Customer and Industrial Service additions provide transmission facilities to meet increasing loads of specific BPA customers. Types of installations proposed for construction are transmission line extensions from the existing system, and substation facilities to provide service at customers' system voltages. The new facilities in this forecast reflect individual BPA customers' load growth or changing requirements.

c. General System Facilities $59,792,000

The FY 1987 General System Facilities program provides new or improved general structures, power system control systems, utility tools and equipment, general purpose, ADP and office equipment and preliminary engineering of transmission system facilities. Funding requirements for General System Facilities are very similar to the funding level of the FY 1986 program, reflecting the continued influence of facility and equipment replacements and upgrades of the system, contrasted with the system expansion emphasis during past periods of rapid load growth.

	Total Cost	FY 1987	Required to Complete
	(In thousands of dollars)		
(1) General Structures and Improvements (Item 810)	4,515	3,164	1,351

General Structures and Improvements provide specialized equipment and vehicle repair and storage facilities for efficient, safe, reliable system maintenance and construction activities. This item includes additions at six substations to contain potential oil spills as part of a BPA-wide retrofit program. It also includes various building additions and remodeling projects at eight BPA facilities to improve maintenance effectiveness and meet environmental and safety laws and regulations.

	Total Cost	FY 1987	Required to Complete
	(In thousands of dollars)		
(2) Power System Control (Item 820)	16,990	10,459	6,531

Key elements in the FY 1987 program include a second of eight phases of retrofitting power circuit breaker failure protection devices: phase one of a system events monitor; phase three of a communications network for southern Idaho system; phase four of system-wide microwave equipment replacement program; and continued replacement of obsolete power system control equipment throughout the BPA system.

	Total Cost	FY 1987	Required to Complete
	(In thousands of dollars)		
(3) Capital Tools and Equipment (Item 830)			
(a) Utility Tools and Equipment	--	10,283	--
(b) ADP General Purpose Equipment	--	20,491	--
(c) ADP Software Development	--	6,717	--
Office Equipment & Systems	--	4,282	--
		41,773	

BPA capital tools and equipment include several general categories: utility tools and equipment for direct support of power system engineering, construction, operation, and maintenance; general purpose ADP support; development of ADP software; and office furniture and equipment capital items. In FY 1987, this budget item provides more than 900 capital tools and equipment items to design, construct, operate, and maintain BPA's transmission lines, substations, and communications and control facilities and to support data and word processing, office management, and other management services. The FY 1987 program funding is within 10 percent of FY 1986 funding requirements.

(a) Utility Tools and Equipment

This component of tools and equipment provides for the additions and replacements of utility tools and equipment to design, construct, operate, and maintain the electric power system. Included are tools, garage and shop equipment; power operated equipment; material handling equipment; transportation equipment; lab and field test equipment, and power system control test equipment. This category of tools and equipment is essential to continued productivity and reliable system operation.

(b) ADP General Purpose Equipment

BPA's ADP general purpose equipment capital acquisition program reflects increased demands on ADP resources due to the implementation of major new management information systems, and other new requirements which necessitate continued enhancement of BPA's computer systems. These enhancements will consist of storage devices, controller, channels, memory and communication equipment to follow-up and complement the processor upgrade in FY 1985, and most significantly, the addition of a second main frame processor in FY 1987.

(c) ADP Software Development

This category of capital tools and equipment includes development by BPA staff and contractors of ADP systems, procedures, and programs to support BPA's utility and management processes. Included are BPA's financial management information system, construction project management information system, materials management system, system maintenance information system, and other high priority ADP software development.

(d) Office Furniture and Equipment

Included are automated office systems, office communications, and other capital equipment and furnitures. High priority items are office furniture and communications facilities for BPA's new headquarters building in east Portland, Oregon, being constructed by the General Services Administration. If anticipated changes in regulations regarding establishment of Federal physical fitness programs to improve employee productivity are made in time, BPA plans to use FY 1986 funds to provide a small physical fitness facility in the new building in accordance with approval received from the President's Council on Physical Fitness.

	Total Cost	FY 1987	Required to Complete
	(in thousands of dollars)		
(4) Preliminary Engineering (Item 840)	4,396	4,396	--

Preliminary engineering includes advance studies, surveys, and environmental analysis. This work is necessary to permit start of construction in time to meet scheduled energization dates. Time schedules are shortened by early preparation of specifications for contract work. Funding of this activity in FY 1987 reflects continuation of the current level of activity plus continued planning studies for new intertie transmission lines.

d. System Electrical Facilities $14,364,000

The FY 1987 System Electrical Facilities program provides for transformer, power circuit breaker, and capacitor additions and replacements, plus other related transmission line and substation changes to prevent or eliminate equipment overloads, maintain service conditions, and eliminate or avoid hazardous waste contamination of electric facilities and their surroundings. Funding required for this budget category also reflects continuation of the FY 1986 level of equipment replacements and upgrades, plus additional funding for the replacement of PCB contaminated electrical equipment.

	Total Cost	FY 1987	Required to Complete
	(in thousands of dollars)		
(1) Transformer Additions (Item 871)	2,911	1,406	1,505

This item provides for added transformer capacity in BPA's substations. The principal types of capacity additions are new transformers and replacement of lower capacity transformers with higher capacity units. Additions to transformer capacity are necessary when existing facilities become overloaded, when they can no longer provide reliable service, or when they are unable to maintain an acceptable standard of voltage regulation.

	Total Cost	FY 1987	Required to Complete
	(in thousands of dollars)		
(2) Miscellaneous Capital Additions and Replacements (Item 880)	16,886	9,618	7,268

This item provides for replacement of critical power circuit breakers and other electrical apparatus on the transmission system and for miscellaneous unforeseen minor capital additions or changes. Replacements are required when electrical equipment is worn out, damaged, destroyed, overloaded, or becomes obsolete. This item continues to grow and increase in scope as the electrical system ages.

	Total Cost	FY 1987	Required to Complete
	(in thousands of dollars)		
(3) PCB Contaminated Equipment Replacement (Item 885)	15,709	3,340	12,369

This item provides for the third of a 15-year continuing program to remove and replace polychlorinated biphenyl (PCB) contaminated electrical equipment on the BPA system. This PCB replacement program is an integral component of BPA's hazardous waste management program. It has been formulated to meet BPA guidelines and Environmental Protection Agency regulations.

3. Revenue Funded Construction Expenses $16,280,000

This budget category comprises annual activities that support the capital construction program. These activities include BPA's in-house research and development (R&D) activities, BPA's financial participation in the Electric Power Research Institute (EPRI), and impact aid to local governments.

a. Transmission Research and Development $6,780,000

To meet the continuing need for new technology, BPA conducts an ongoing research and development program of technical and scientific investigations on various aspects of electric power transmission. These are carried out through: (1) in-house investigations; (2) single sponsor contracts with industrial firms, research corporations and institutions; and (3) cooperative investigations with other utilities, government institutions and industries.

b. EPRI Support $9,500,000

In recognition of its electric utility responsibilities, BPA participates financially in the research and development activities of the Electric Power Research Institute (EPRI). EPRI was established by public and private utilities to develop a coordinated national electric power research and development program. EPRI funding is provided by approximately 600 participating utilities nationwide, with individual utility contributions determined by a formula based upon energy deliveries. Financial participation in EPRI complements and is closely coordinated with BPA's in-house research and development program. This budget reflects a BPA decision to increase its contributions so that its funding level is consistent with BPA's total energy sales by 1991, in recognition of EPRI benefit to the Pacific Northwest and BPA's utility role in the region.

c. Impact Aid

This item provides funding for the impact aid provision of the Pacific Northwest Power Act, although no funding is required for FY 1987.

Pursuant to Section 7(m) of the Act BPA may make annual impact aid payments to appropriate local governments within the region with respect to BPA "major transmission facilities".

BPA has adopted an impact aid policy and formula. Payment cannot be made until the formula is approved by FERC. The first payment will probably be made in FY 1986, when FERC is expected to approve the formula. The first annual payment will cover impacts since enactment of the Pacific Northwest Power Act on December 5, 1980. Funding beyond the initial implementation of impact aid is expected to be nominal because the initial payments will primarily cover the impacts of construction of "major facilities" since passage of the Act. BPA expects no additional major facilities in the next several years. Thus, funding is provided in FY 1986 to cover initial implementation. No specific funding has been identified thereafter. BPA plans to absorb any minor payments that might occur in FY 1987 by reducing other revenue funded requirements. Should substantial impact aid requirements occur in FY 1987, BPA would make budget adjustments as necessary to specifically identify impact aid funding.

SYSTEM PLANNING AND CONSTRUCTION
PROGRAM SUMMARY
(in thousands of dollars)

Item No.	Facility	Estimated Total Costs	Actual Obligations thru 9/30/84	Actual 1985 Program	Estimated 1986 Program	Estimated 1987 Program	To Complete
	Main Grid						
102	Eugene-Medford	9,346	0	0	0	4,643	4,703
103	Third AC Reinforcement	65,818	0	0	0	32,471	33,347
150	System Reactive	5,232	0	0	0	3,359	1,873
	Subtotal	80,396	0	0	0	40,473	39,923
	Area and Customer Services						
112	Industrial Service	2,776	0	0	0	1,912	864
705	Fossil Area Reinforcement	5,272	0	0	0	2,335	2,937
770	Customer Services	3,487	0	0	0	2,048	1,439
	Subtotal	11,535	0	0	0	6,295	5,240
	General System Facilities						
810	General Structures	4,515	0	0	0	3,164	1,351
820	Power System Control	16,990	0	0	0	10,459	6,531
831	Power System Tools	10,283	0	0	0	10,283	0
832	ADP General Purpose Equipment	20,491	0	0	0	20,491	0
833	Office Furniture & Equipment	4,282	0	0	0	4,282	0
834	ADP Software Development	6,717	0	0	0	6,717	0
840	Preliminary Engineering	4,396	0	0	0	4,396	0
	Subtotal	67,674	0	0	0	59,792	7,882
	System Electrical Facilities						
871	Transformer Additions	2,911	0	0	0	1,406	1,505
880	Miscellaneous Replacements & Additions	16,886	0	0	0	9,618	7,268
886	PCB Contaminated Equipment	15,709	0	0	0	3,340	12,369
	Subtotal	35,506	0	0	0	14,364	21,142
	Total Proposed System Additions	195,111	0	0	0	120,924	74,187
	Total Programmed in Prior Years	950,826	389,366	136,182	256,215	56,976	112,087
	Total Proposed System Additions	195,111	0	0	0	120,924	74,187
	Transmission Research & Development, EPRI	49,686	7,315	11,191	14,900	16,280	0
	Impact Aid	1,000	0	0	1,000	0	0
	Planned Construction Program	1,196,623	396,681	147,373	272,115	194,180	186,274
	Undistributed Reduction	-29,315	0	0	-22,215	-7,100	0
	Funded Construction Program	1,167,308	396,681	147,373	249,900	187,080	186,274

CONSTRUCTION PROGRAM
DETAIL OF PREVIOUSLY PROGRAMMED FACILITIES
(in thousands of dollars)

Item No.	Facility	Estimated Total Costs	Actual Obligations thru 9/30/84	Actual 1985 Program	Estimated 1986 Program	Estimated 1987 Program	To Complete
	Facilities Programmed in Prior Years						
	Main Grid						
111	D.C. Terminal Expansion	89,811	0	2,296	78,966	7,469	1,080
119	Flathead Valley Reinforcement	3,736	81	1,771	1,585	299	0
120	Bend Area Support	12,285	2,886	5,005	3,938	456	0
126	Longview Area Transformer Support	16,849	0	0	0	41	16,808
132	Port Angeles Area Reinforcement	21,465	0	0	532	4,043	16,890
135	Fall River-Lower Valley Reinforcement	15,638	0	0	6,445	2,881	6,312
150	System Reactive	14,899	3,465	1,711	4,717	2,137	2,869
185	Taft-Bell 500 kV Reinforcement	82,917	4,805	15,776	53,055	3,346	5,935
	Subtotal	257,600	11,237	26,559	149,238	20,672	49,894
	Area and Customer Services						
112	Industrial Service	2,638	0	0	1,819	819	0
316	Salem-Tillamook	4,589	268	11	234	1,734	2,342
701	East Lewis County Support	3,440	0	0	988	1,011	1,441
703	Shelton Reinforcement	1,059	0	253	792	14	0
722	North Pasco Support	702	0	0	415	260	27
770	Customer Services	36,917	18,472	5,404	6,575	4,179	2,287
	Subtotal	49,345	18,740	5,668	10,823	8,017	6,097
	General System Facilities						
810	General Structures	25,163	11,382	3,528	7,238	1,331	1,684
820	Power System Control	101,639	20,391	20,239	20,865	19,272	20,872
831	Power System Tools	18,968	0	5,375	13,593	0	0
832	ADP General Purpose Equipment	17,249	0	5,531	11,718	0	0
833	Office Furniture & Equipment	3,809	0	668	3,141	0	0
834	ADP Software Development	17,547	0	9,879	7,668	0	0
835	Aircraft Replacement	2,425	0	0	2,425	0	0
840	Preliminary Engineering	5,631	0	1,449	4,182	0	0
	Subtotal	192,431	31,773	46,669	70,830	20,603	22,556
	System Electrical Facilities						
871	Transformer Additions	14,438	9,895	377	1,851	1,419	896
880	Misc. Replacements & Additions	32,762	5,860	4,346	15,504	4,520	2,532
885	PCB Contaminated Equipment	7,309	0	21	5,530	1,745	13
	Subtotal	54,509	15,755	4,744	22,885	7,684	3,441
	Undistributed Carryover	30,099	0	0	0	0	30,099
	Items Completed in Current Year (FY 86)	344,829	306,442	35,948	2,439	0	0
	Completion of Prior Year Programs	22,013	5,419	16,594	0	0	0
	Total Programmed in Prior Years	980,826	389,366	136,182	256,215	56,976	112,087

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

OPERATING PROGRAMS SUMMARY

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(In thousands of dollars)		
System Operations	27,937	33,300	36,200
System Maintenance	66,516	75,900	81,900
Power Scheduling	3,734	4,300	4,700
Power Marketing	11,707	12,700	13,700
Fish and Wildlife	26,143	34,200	44,200
Planning Council	6,196	6,500	6,400
TOTAL	142,233	166,900 1/	187,100

1/ This total does not reflect a reduction in FY 1986 obligations of approximately $2,477,000 which was required by the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177, Gramm-Rudman-Hollings).

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

SYSTEM OPERATIONS $36,200,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(In thousands of dollars)		
1. Substation Operations	19,518	23,300	25,400
2. Power System Control & Dispatching	7,050	8,200	8,900
3. Operations Standards & Engineering	1,369	1,800	1,900
TOTAL	27,937	33,300 1/	36,200

The FY 1987 costs for the System Operations program are expected to increase $3,700,000 from the FY 1986 program. This increase is due primarily to higher labor rates and indirect costs, inflation, and increased contract activity. These increases have been partially offset by reductions in substation operating personnel. This reduction in personnel is made possible by increased reliance on automated control of substations from remote locations and implementation of changes in reliability and manning standards.

1. Substation Operations $25,400,000

This activity covers operating functions necessary to provide electric service to customers and to protect the Government's investment in electric equipment. In FY 1987, this activity will provide for the continued operation of over 380 substations.

Substation operations include making system and equipment adjustments to maintain loads and voltages within acceptable limits, switching to de-energize lines and equipment during emergencies or for scheduled maintenance, isolating damaged equipment, restoring service to customers, visually inspecting equipment, reading meters, and recording line and equipment loadings and voltages. Contracting for certain caretaking functions at substations is included in this activity and is expected to increase for FY 1987.

2. Power System Control and Dispatching $8,900,000

This activity includes central control of the electric operation of the Federal transmission system including load, frequency, and voltage control of Federal generating plants; the operation of the system control and data acquisition computers at the Dittmer System Control Center; and the modification and maintenance of the operation-related computers (e.g., computer terminal equipment, computer programs). Major emphasis will be placed on automating collection of billing data, consolidating the scheduling and dispatching of power for Southern Idaho at the Eastern Control Center, load frequency control, dispatching power over the Federal transmission system; and coordinating the operation of the power system with other interconnected systems.

1/ Does not reflect a reduction in FY 1986 obligations of approximately $800,000 which was required by the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177, Gramm-Rudman-Hollings).

3. Operations Standards and Engineering $1,900,000

This program includes tests and studies of the power and reactive flows and voltages on the transmission system for a variety of operating conditions during the year, review of power system disturbances, and establishment of criteria for operating under expected conditions for the next operating year. Also included are investigations of emergency operating programs, review of substation manning standards, and supervision of the operation of BPA's power transmission system.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

SYSTEM MAINTENANCE $81,900,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of dollars)		
1. Transmission Lines	17,356	22,000	22,600
2. Substations	18,890	24,200	27,200
3. System Protection	7,434	7,400	7,900
4. Power System Control Equipment	10,262	10,300	11,000
5. Non-Electric Plant Maintenance	7,448	8,000	9,000
6. Maintenance Standards & Engineering	5,126	4,000	4,200
TOTAL	66,516	75,900 1/	81,900

The System Maintenance program for FY 1987 will require an estimated $81,900,000, an increase of $7,277,000 over FY 1986. The increase comes from increased emphasis on preventive maintenance and hazardous waste management, higher labor, material and indirect costs, and increased building rental costs.

During FY 1987, BPA plans to accomplish approximately 72 percent of the scheduled preventive maintenance, an increase of 5 percent over current levels. This increased level of preventive maintenance will be accomplished in part by more contracting of transmission line and substation maintenance activities, with particular emphasis on preventive maintenance.

1. Transmission Lines $22,600,000

The transmission line maintenance program for FY 1987 involves the patrol and maintenance of nearly 14,500 circuit-miles of transmission lines throughout the power system. It includes performing emergency repairs to the transmission lines and structures, maintaining rights-of-ways through danger tree and brush control, and access road repair and maintenance.

2. Substations $27,200,000

This program provides for the preventive and corrective maintenance of substation equipment and related facilities such as circuit breakers, transformers, capacitors, and switches. Scheduled preventive maintenance enhances power system reliability and reduces costly catastrophic equipment failures. Corrective maintenance restores normal system operating conditions and is accomplished as needed. During FY 1987, work associated with polychlorinated biphenyl (PCB) contaminated equipment will continue at a high level and more scheduled preventive maintenance will be accomplished.

1/ Does not reflect a reduction in FY 1986 obligations of approximately $1,277,000 which was required by the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177, Gramm-Rudman-Hollings).

3. System Protection $7,900,000

This activity includes maintenance of all control systems, including digital-based systems, d-c control systems, or power system relays, to insure no increase in customer outage rates or major equipment damage. Also included is the maintenance of meters necessary to record the operation of the power system and record demand and energy deliveries for billing purposes.

4. Power System Control Equipment $11,000,000

This involves maintenance of all power line carrier, radio, digital, and submultiplex systems and microwave equipment. The PSC program is a corrective maintenance program and assures timely restoration of service, proper relaying, and secure control actions.

5. Non-Electric Plant Maintenance $9,000,000

Non-Electric Plant Maintenance includes site, building, and building utility maintenance; custodial services; station utility; transportation maintenance; land management and operation; and other maintenance service activities on BPA-owned or leased nonelectric facilities associated with the electric transmission system. During FY 1987, funding requirements increase because of inflation and increased indirect costs. In addition, more roof repair jobs are planned and work done to assure compliance with National Pollution Discharge Elimination System requirement will be emphasized.

6. Maintenance Standards and Engineering $4,200,000

The FY 1987 maintenance standards and engineering program will concentrate on updating and establishing standards, policies, and procedures for system maintenance, as well as reviewing, developing, and implementing a system-wide, long-range maintenance plan.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

POWER SCHEDULING $4,700,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of dollars)		
Power Scheduling	3,734	4,300	4,700
TOTAL	3,734	4,300 1/	4,700

The Power Scheduling Program consists of short term forecasting (30 days or less) of the hourly power requirements of BPA customers and the interchange of power with other utilities. These requirements are then met by scheduling generation at Federal plants, purchasing power on a short term basis, or by other means. Weather and streamflow forecasting, controlling the storage and utilization of water in reservoirs, and coordinating power production with the multipurpose operation of the Columbia River are other primary activities associated with power scheduling.

Efforts in FY 1987 will focus on implementing the Intertie Access Policy through scheduling surplus power on the Pacific Northwest-Pacific Southwest Intertie. Scheduling and managing power and water releases consistent with the Northwest Electric Power Planning and Conservation Council's Fish and Wildlife Program's Water Budget will continue as a priority work activity. FY 1987 funding requirements increase by $400,000 because of higher indirect costs.

1/ Does not reflect a reduction in FY 1986 obligations of approximately $125,000 which was required by the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177, Gramm-Rudman-Hollings).

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

POWER MARKETING $13,700,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(In thousands of dollars)		
1. Wholesale Power and Transmission Rates	3,862	4,500	4,800
2. Power Contracts and Customer Service	5,144	4,600	5,000
3. Special Coordination	2,701	3,600	3,900
TOTAL	11,707	12,700 1/	13,700

Power Marketing costs are expected to increase by $1,225,000 in FY 1987. This increase results from inflation and higher labor and indirect costs.

1. Wholesale Power and Transmission Rates $4,800,000

The Wholesale Power and Transmission Rate function develops the rates that customers pay BPA for electric power and for wheeling their own power on BPA's transmission system. These rates are established through a rate making process that is consistent with provisions of the Pacific Northwest Power Act and includes extensive public involvement. Rates must be adequate to insure revenues sufficient to pay BPA's operating expenses, debt repayment, and amortization of the Federal investment in the Federal Columbia River Power System hydroelectric projects.

Rate development activities include developing rate schedules, preparing rate design studies and marginal cost analyses, researching rate design methods, coordinating the development of cost of service analyses, preparing General Rate Schedule Provisions, and evaluating wholesale rate impacts on various markets.

During FY 1987, attention will focus on developing and implementing the supplemental rate charges required by Section 7(b)3 of the Pacific Northwest Power Act and in analyzing different market sectors both within and outside of the Pacific Northwest and their response to alternative rate designs.

2. Power Contracts and Customer Service $5,000,000

The Power Contracts function negotiates, administers, and coordinates contracts for power sales, power exchanges, conservation, wheeling, and resource services. Customer Service analyzes, processes, and issues all customer bills.

1/ Does not reflect a reduction in FY 1986 obligations of approximately $275,000 which was required by the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177, Gramm-Rudman-Hollings).

During FY 1987, emphasis will be placed on developing regional markets for surplus energy through incentive rates for Direct Service Industries, new industrial customers in the Northwest, and alternate fuel load programs. BPA will continue to aggressively pursue additional short and long term sales of surplus power to California. Expiration of the capacity/energy exchange contracts with California utilities in the 1986-88 period will require new long term contracts to meet the future needs of California.

The last phase of the Remote Metering System will be completed in FY 1987. This system, one part of our efforts to modernize power billing methods, will facilitate the accurate and timely billing of our customers.

3. Special Coordination $3,900,000

Special Coordination provides specialized support to the Power Marketing Program in surplus power marketing efforts, intertie transfer policy development and analysis, and increased public involvement support in all phases of policy development. It also provides environmental analysis in support of fish and wildlife projects, the intertie access policy, the acquisition of resource options, and in various rate options considered by BPA.

BPA's emphasis on extra regional power sales, increasing intertie transfer capability, and on providing Northwest utilities with equitable access to intertie facilities will continue in FY 1987. As a result, the funding need for Special Coordination activities will remain relatively constant.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

FISH AND WILDLIFE $44,200,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of dollars)		
Fish and Wildlife Program	26,143	35,200	44,200
Undistributed Reduction 1/	--	-1,000	--
FUNDED PROGRAM	26,143	34,200	44,200

Under Section 4(h) of the Pacific Northwest Power Act, BPA is to use the Bonneville Fund to protect, mitigate and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The Pacific Northwest Power Act also assigns to BPA, the U.S. Army Corps of Engineers, and U.S. Bureau of Reclamation fish and wildlife responsibilities in the management and operation of Federal Columbia River Power System hydroelectric facilities.

Consistent with the provisions of the Pacific Northwest Power Act, BPA discharges a major portion of its Columbia River Basin fish and wildlife responsibilities by funding projects designed to accomplish measures in the Pacific Northwest Electric Power and Conservation Planning Council's (Planning Council) Columbia River Basin Fish and Wildlife Program (Program).

BPA's fish and wildlife program level covers all staff costs and related obligations for BPA's direct funding of capital investment/construction and operating expenses for fish and wildlife activities. The rapid growth in the program reflects BPA's continued commitment to its responsibilities under the Pacific Northwest Power Act. Most of the FY 1987 budget will fund the continuation of projects begun in FY 1986 or before, with increases largely attributable to projects reaching the design and construction stages in FY 1987. The funding levels shown below are subject to shifts among categories based on assessment of amendments to the Planning Council's Program and consultation with Pacific Northwest fish and wildlife agencies and Indian tribes.

FY 1987 funding plans include offsite compensation (mainly natural propagation enhancement, including habitat and non-hydroelectric dam passage improvements); artificial propagation facilities, including hatcheries; measures which address "systemwide" impacts; and studies, research and development which yield knowledge, technologies, and procedures usable in hydroelectric mitigation throughout the Columbia River Basin. These plans reflect BPA's role in achieving the fish and wildlife objectives of the Pacific Northwest Power Act and its commitment to supporting the Planning Council's Program. BPA's plans focus on funding Program measures which are not facility-specific. (The Corps of Engineers, Bureau of Reclamation and other hydroelectric operators have responsibility for facility-specific Program measures.)

1/ Undistributed Reduction: Funding adjustment to scheduled program provides for program reductions, and slippages due to unidentified delays. Changing regional circumstances may require adjustments within the funding level between subprograms or programs.

Six of the major capital projects discussed below, including one FY 1987 new start, were incorporated by the Planning Council into their amended Program issued in October 1984. The six projects are Tumwater Falls Passage, Dryden Dam Passage, Yakima Hatchery, Enloe Dam Passage (FY 1987 new start), Colville Hatchery and Nez Perce Propagation Facility. Except for Enloe Dam Passage, all of these projects were added to BPA's budget during Congressional consideration of the FY 1986 budget.

Anadromous Fish $34,000,000

As intended by the Pacific Northwest Power Act, most planned funding will address the Columbia River Basin's salmon and steelhead runs. Offsite habitat and passage improvements to enhance natural propagation comprise the single largest category of planned funding in FY 1987. Passage improvements provide access to spawning and rearing grounds and reduce passage mortalities at barriers and diversions. Typical habitat improvements involve creation of side channels, instream structures, and riparian enhancement to increase juvenile production.

Several Yakima River Basin projects are complete or scheduled for completion. Improvements at the Wapato Diversion Dam and Toppenish/Status Diversion Dam are expected to be completed in FY 1986. Part of the Sunnyside Dam Passage project was completed in FY 1985 when fish screens were installed and placed in operation. The balance of construction at Sunnyside, two fish ladders, is expected to be completed in FY 1986.

Two Wenatchee River projects are located in Washington. Dryden Dam Fish Passage and Tumwater Falls Dam Fish Passage are fish ladder construction projects located at Dryden Irrigation Diversion Dam and the Tumwater Dam, respectively. At Dryden the existing fish ladder will be improved. At Tumwater Falls a new fish ladder will be constructed. These fish ladders are expected to allow for higher fish production from improved access to anadromous fish habitat. Construction for the two projects is expected to be completed during FY 1986.

Enloe Dam passage is a major new project scheduled for construction in FY 1987. Enloe Dam is located on the Similkameen River, a tributary of the Okanogan River, in northeastern Washington. The 54 foot high hydroelectric dam was completed in 1923 without fish passage facilities. Following a decision on the selection of the preferred engineering alternative construction should begin in FY 1987. The selection by BPA of the preferred alternative will include discussions with various Canadian and Washington State and Federal fish and wildlife agencies and Indian Tribes within the region. The purpose for the project is to provide access for anadromous salmonids to over 350 miles of spawning and rearing habitat in the upper Similkameen River watershed. The establishment of an anadromous fish run throughout the Similkameen River Basin would be considered as offsite mitigation for juvenile fish losses occurring on the mainstem Columbia River.

Construction on Three Mile Dam Fish Passage is expected to be complete in FY 1987. This project has encountered delays over the selection of the appropriate passage alternative and execution of an operation and maintenance agreement for the completed facility. Agreement on the final design for the facility is expected by the end of FY 1985. No further delays are anticipated with this project.

Development of artificial production facilities is another major category of BPA funding. The Yakima Hatchery is scheduled for the start of construction in FY 1987. The final design and schedule will be determined following completion of a master plan which is under development by the Northwest Power Planning Council.

The Nez Perce Fish Propagation Facility is a major project that would be located within the Nez Perce Indian Reservation. When the final design and cooperative management issues are resolved, construction of this small-scale facility will begin. Construction is forecasted to begin in FY 1987. If constructed, it would provide smolts for release into the 300 mile river and stream system on the Reservation. This system experienced a loss in the fishery resource due to various land-use practices including the hydroelectric system.

Construction on the Umatilla Hatchery is expected to be complete in FY 1988. This project has experienced unanticipated delays due to problems associated with acquisition of land for the site. Preliminary design is expected to begin by the end of FY 1986.

Funding of downstream migration monitoring and related studies will continue in FY 1987. Monitoring tracks smolt movement between dams for operation of the Water Budget, which is a river flow management technique that helps determine river flows to aid spring outmigration. Studies examine resident fish predation on migrating smolts, effects of dam operations on migration, and other, related subjects, and are aimed at increasing the survival of migrating salmon and steelhead smolts.

Improving fish culture practices and disease control at existing hatcheries is planned for continued emphasis in FY 1987. Disease exacts a heavy toll on the vitality and production of Columbia River Basin hatcheries, and improvements in hatchery practices are expected to substantially increase hatchery effectiveness, hence the contribution of hatchery fish to harvests. Research and Development (R&D) projects which are expected to continue in FY 1987 include the development of diets to improve survival after release and the development of vaccines and other techniques for controlling viral disease Infectious Hematopoietic Necrosis and bacterial kidney disease; increased fish health monitoring, improved smolt indices, and technical information transfer for improving hatchery effectiveness.

Resident Fish $4,200,000

BPA will also continue to fund projects to protect, mitigate, and enhance resident fish. Major construction of the Cabinet Gorge hatchery was completed in FY 1985. The date for operation of the hatchery is one hatchery production season ahead of schedule. BPA will evaluate the contribution of the hatchery to the fishery of Lake Pend Oreille once the hatchery is placed in operation.

The Colville hatchery, a resident trout hatchery, will be located on the Colville Indian Reservation. The hatchery is scheduled for construction during the two years FY 1987-FY 1988. When completed, hatchery production is expected to be approximately 50,000 pounds of trout annually. The hatchery will compensate for anadromous fish losses resulting from the construction and operation of the Chief Joseph and Grand Coulee Dams located on the Columbia River.

Many of the resident fish measures called for in the Program are to be carried out in Montana where anadromous fish runs are blocked by natural obstructions. An area of particular concern is the Flathead River Basin where hydroelectric development and operations have drastically altered the fisheries. BPA proposes to continue funding research of the resident fishery resource in the Flathead Basin with a goal of developing a basin-wide plan for protection. In FY 1985, workshops were held with the fisheries agencies, tribes and the public to determine the necessary research requirements for the establishment of a protection, mitigation, and enhancement program for white sturgeon. Funds for projects developed in the workshops are included in the program.

Wildlife $2,500,000

The Program calls for wildlife mitigation plans for hydroelectric facilities in the Columbia River Basin. BPA plans continued funding for the development of mitigation plans for Willamette River Basin Federal dams in FY 1986, with completion estimated for FY 1987. Mitigation planning will also be undertaken for the following facilities or river basins: Dworshak Dam on the Clearwater River, Idaho, Upper Snake River Basin, Idaho, and Grand Coulee Dam on the Columbia River, Washington. Funding of mitigation activities at Libby Dam on the Kootenai River, Montana, and the Hungry Horse Dam on the Flathead River, Montana are anticipated during FY 1987.

New Hydroelectric Development $700,000

Fish and wildlife resources of the Columbia River Basin have been adversely affected by past hydroelectric development and could be harmed even more by future development. BPA is developing information on the cumulative effects of new hydroelectric systems (many less than 5 megawatts) on streams and rivers and evaluating alternative turbine intake screens. Work will continue on the development of a method to objectively evaluate rivers and streams to establish protected areas from future hydroelectric development for fish and wildlife.

New Program Measures $2,800,000

The FY 1987 budget also includes funding for new measures that may be added to the Program by amendment. The Planning Council is scheduled to amend its Program in December 1986. Anticipated use for part of these funds will be for the acquisition of land or easements to implement wildlife protection and mitigation actions.

BPA funding for the fish and wildlife projects will be identified through solicitations and invitations to bid, with funds being provided to the region's Federal and State fish and wildlife agencies, Tribes, universities, and consultants. In funding projects, every assurance is made that: (1) ratepayer funds are not replacing expenditures that are required of others, (2) projects funded are not duplicating other ongoing activities, (3) projects initiated reflect the highest priority fish and wildlife needs, and (4) the proposing agency, Tribe or researcher is qualified to undertake a specific activity.

MAJOR CAPITAL PROJECTS

PROJECT	FY 1985 Actual	FY 1986 Estimate	FY 1987 Estimate
	(In thousands of dollars)		
Carryovers			
Sunnyside Dam Passage	4,476	0	0
Wapato Diversion Dam	2,604	3,925	0
Toppenish/Satus Diversion	1,579	225	0
Cabinet Gorge Hatchery, Lake Pend Oreille	1,253	625	0
Three Mile Fish Passage	312	525	2,850
Umatilla Hatchery	0	1,725	650
Subtotal	10,224	7,025	3,500
FY 1986 Starts			
Tumwater Falls Passage	0	1,350	0
Dryden Dam Passage	0	1,350	0
Yakima Hatchery	0	825	6,100
Coleville Hatchery	0	300	2,650
Nez Perce Capital Facility	0	325	2,025
Subtotal	0	4,150	10,775
FY 1987 New Starts			
Enloe Dam	0	325	2,725
New Measures	0	0	1,500
Subtotal	0	325	4,225
SUBTOTAL SCHEDULED PROGRAM	10,224	11,500	18,500
Undistributed Reduction	--	-1,000	--
FUNDED PROGRAM	10,224	10,500	18,500

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

PLANNING COUNCIL $6,400,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of dollars)		
Planning Council Budget	6,196	6,500	6,400

Creation of the Pacific Northwest Electric Power and Conservation Planning Council (Council) was authorized by passage of the Pacific Northwest Power Act on December 5, 1980.

The Council was formally established on April 28, 1981. It consists of eight members, two appointed by each of the four Pacific Northwest Governors (Idaho, Montana, Oregon, and Washington), and is presently supported by a central staff of approximately 43 employees and State support staffs totaling 15 employees.

The Council's initial responsibility was the preparation of a Columbia River Basin Fish and Wildlife Program (Program) which the Council adopted on November 15, 1982, and a Northwest Conservation and Electric Power Plan (Power Plan) which the Council adopted on April 27, 1983. Among other elements, that Power Plan included an energy conservation program, a regional 20-year demand forecast, and a forecast of needed regional resources. The Power Plan provides guidance for future development of the Pacific Northwest's power system over a planning horizon of 20 years.

During FY 1984 the Council considered extensive amendments to the Program which were adopted on October 10, 1984. As part of the fish and wildlife amendment process the Council also adopted a Five-Year Fish and Wildlife Action Plan to provide more precise guidance for the implementing agencies (Bonneville Power Administration, Corps of Engineers, Bureau of Reclamation, State and Federal Fish and Wildlife agencies, the Federal Energy Regulatory Commission, Indian tribes, and others) on scheduling of measures in the Program. The Council continues to discuss and take public comment on various aspects of both the Power Plan and the Program at periodic Council meetings held on an average of once every 3 weeks.

In FY 1985, the Council began preparating its second Power Plan and it monitored the actions taken in response to the Two-Year Action Plan of the original Power Plan and the Five-Year Action Plan of the Program. The second power plan is scheduled for adoption in FY 1986.

The Council continues Power Plan and Fish and Wildlife investigations. Progressively less and less of its investigations are performed by consultants and contractors, and more and more by its own professional staff. Public information and education activities will continue in FY 1986 and FY 1987 through newsletters, special mailings and Council meetings that are designed to inform the public and regional utilities about Council policy on energy and fish and wildlife issues. The Council plans to revise its Power Plan and Fish and Wildlife Program every 2 years, alternating with the Plan one year and the Program the next. During FY 1987, the Council expects to adopt a revised Fish and Wildlife Program.

The Council's revised FY 1986 request reflects a $155,000 reduction from the amount shown in the FY 1986 Congressional Budget. The Council's proposed FY 1987 budget is lower still.

Funding for the Council is provided by BPA and is recoverable from BPA rates. The Pacific Northwest Power Act directs that expenses of the Council (subject to certain limits) shall be included in BPA's annual budget submitted to Congress pursuant to the Transmission Act of 1974. The limits are computed as a millage rate times the kilowatthours of firm power forecasted to be sold by BPA.

The lower ceiling millage rate is .02 mill per kilowatthour. The Pacific Northwest Power Act provides that BPA may raise the lower ceiling and pay Council expenses up to an annual amount not to exceed an upper ceiling 0.10 mill per kilowatthour, upon a showing by the Council that funds in excess of the lower ceiling are needed to enable the Council to carry out its functions and responsibilities under the Pacific Northwest Power Act. The Council asserts that its current budget and accompanying documents constitute such a showing.

The Council has provided BPA with a FY 1986 revised budget and FY 1987 budget. Based on BPA's firm power sales forecasts, the $6,536,000 1/ revised budget proposed by the Council for FY 1986 represents approximately .065 mill per kilowatthour and the $6,464,000 budget for FY 1987 translates into approximately .063 mill per kilowatthour. The Council, in its budget submittal to BPA, stated that the proposed funding levels are necessary for the Council to carry out its functions and responsibilities under the Pacific Northwest Power Act. BPA has reviewed the Council's budget in relation to the showing required in the Pacific Northwest Power Act, concluded that a showing has been made, and has raised the lower limit accordingly.

1/ Northwest Power Planning Council Budget and Expenditure Summary

Budget Category	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of	dollars)
Staff Compensation	2,232	2,357
Travel	356	303
Contracts	882	640
Other Operating Expenses	1,226	1,293
States Allocations	1,840	1,871
TOTAL	6,536	6,464

Note: The Council has discretion in allocating funds within each of these five major budget categories. BPA's understanding with the Council is that there will be no shift of allocated funds from one major budget category to another by the Council without first consulting with and obtaining the approval of BPA.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

REIMBURSABLE $48,700,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Estimate Obs
	(in thousands of dollars)		
1. Power Purchases	20,648	39,200	39,700
2. Work Done for Others	6,435	8,200	9,000
TOTAL	27,083	47,400	48,700

1. Power Purchases

Reimbursables power purchases include energy transactions involving the Hanford Generating Project (HGP) and other energy management reimbursable activities.

(a) Hanford Generating Project $21,400,000

Current contracts provide for HGP operation through 1993, if by-product steam from DOE's N Reactor is available. During the period FY 1985 through FY 1991 Hanford Extension Energy in an amount equal to 28 percent of that produced by the HGP will be delivered to Pacific Power and Puget Sound Power and Light at project operating costs. The $21.4 million estimated obligations for FY 1987 constitutes the IOUs' 28 percent share of HGP annual disbursements for fuel (steam), taxes, capital additions, and other operating expenses.

The public agency participants pay the remaining 72 percent of HGP operating costs, as well as 100 percent of Hanford debt service, through the WNP-1 net-billing agreement. The Resource Acquisition, Planning, and Oversight section of this document contains these costs.

(b) Other $18,300,000

BPA also processes through reimbursable accounts the cash inflows and outflows associated with various power sales and transmission agreements with other utilities for energy transactions managed by BPA. These include an Exportable Agreement affecting PNW-PSW Intertie transactions, IRE Trust Agreement for industrial power, and a Service and Exchange Agreement with mid-Columbia utilities.

2. Work Done for Others $9,000,000

BPA constructs, operates, and maintains transmission facilities, and provides related utility and general support for customers and other entities, when requested and financed by other benefitting entities and the requested action is in BPA's interest. Funding for this item is provided by benefiting entities on a trust or reimbursable basis.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

INTEREST EXPENSE FOR BPA BORROWINGS $211,300,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Obs Current Services Estimate	FY 1987 Obs Repayment Proposal
		(in thousands of dollars)		
Interest Expense for BPA Borrowings	164,335	188,900	211,300	194,600 1/

The Transmission Act, as amended by the Pacific Northwest Power Act and replenished by Public Law 98-50, provided borrowing authority of $3.75 billion to assist in financing the construction, acquisition, and replacement of the transmission system and to implement the Administrator's authority pursuant to the Pacific Northwest Power Act, including his authority to provide financial assistance for conservation measures, renewable resources, and fish and wildlife. This item covers the payment of interest to the U.S. Treasury on those borrowings.

1/ Results of modified repayment proposal.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

ASSOCIATED PROJECT COSTS $121,700,000

	FY 1985 Actual Obs	FY 1986 Estimate Obs	FY 1987 Obs Current Services Estimate	FY 1987 Obs Repayment Proposal
	(In thousands of dollars)			
1. Bureau of Reclamation	42,804	46,400	50,100	71,900
2. Corps of Engineers	54,980	56,700	59,500	59,500
3. Federal Energy Regulatory Commission Coordination Agreement	2,845	3,200	3,400	3,400
4. Lower Snake River Compensation Plan	5,355	7,900	8,700	8,700
Total	105,984	114,200	121,700	143,500 1/

FY 1987 Current Services estimates:

1. Bureau of Reclamation $50,100,000

This item includes payments to the Reclamation Fund covering the costs of operation and maintenance, interest, and amortization of Bureau of Reclamation projects allocated to be repaid from BPA revenues. In FY 1985 $12,800,000 in amortization was paid to the Treasury. The increase from FY 1986 to FY 1987 results from an increase in interest expenditures associated with funding the Bureau's generating facilities replacements.

2. Corps of Engineers Operation and Maintenance Expense $59,500,000

This item covers payments to the General Fund of the Treasury covering the operation and maintenance costs of Corps of Engineers generating projects repayable from BPA revenues. Planned increases are the result of inflation. (Payments also are made to the Treasury from BPA revenues for interest and amortization of the power investment in the Corps of Engineers projects. These costs are treated as Capital Transfers and appear in that section.)

3. Federal Energy Regulatory Commission Coordination Agreement $3,400,000

This item includes payments to the General Fund of the Treasury which the Federal Energy Regulatory Commission determines are due the Federal Government pursuant to Section 10(f) of the Federal Power Act for downstream benefits realized at non-Federal hydroelectric projects as a result of storage releases from upstream Federal reservoirs. The payments are made in accordance with the Pacific Northwest Coordination Agreement and are credited to the Corps of Engineers and Bureau of Reclamation accounts in relation to the amount each agency's projects have benefited the downstream owners.

1/ Results of modified repayment proposal.

4. Lower Snake River Compensation Plan $8,700,000

This item includes payments to the General Fund of the Treasury covering the operation and maintenance of the Lower Snake River hatcheries pursuant to the Lower Snake River Compensation Plan (LSRCP) authorized by the Water Resources Development Act of 1976. In total, 22 hatchery facilities are planned for LSRCP. The increased operation and maintenance costs from FY 1985 through FY 1987 is the result of completed facilities going into operation.

LSRCP stipulates that 100 percent of the anadromous fish and 83.8 percent of resident fish mitigation costs be repaid to the Treasury from power sales. The Corps of Engineers is constructing the hatchery facilities through direct appropriations. The Fish and Wildlife Service manages the operation and maintenance of the facilities which are also funded through appropriations.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

CAPITAL TRANSFERS $321,100,000

	FY 1985 Actual	FY 1986 Estimate	FY 1987 Current Services Estimate	FY 1987 Repayment Proposal
		(in thousands of dollars)		
1. BPA Appropriation Interest	57,702	58,800	58,800	58,800
2. Corps of Engineers Appropriation Interest	127,587	112,900	112,200	112,200
3. Lower Snake River Compensation Plan Interest	0	4,500	1,500	1,500
4. Amortization	215,076	190,800	148,600	282,900
TOTAL	400,365	367,000	321,100	455,400 1/

Capital transfers, although not treated in BPA's budget as a program obligation, represent an important use of BPA revenues in any fiscal year and, therefore, are separately defined and discussed in this section.

FY 1987 Current Services estimates:

1. BPA Appropriation Interest $58,800

This item covers payments to the General Fund of the U.S. Treasury to repay interest due on appropriated funds used to finance BPA transmission facilities.

2. Corps of Engineers Appropriation Interest $112,200

This item covers payments to the General Fund of the U.S. Treasury to repay interest due on appropriated funds used to finance Corps of Engineers power generation facilities.

3. Lower Snake River Compensation Plan Interest $1,500

This item covers payment to the General Fund of the U.S. Treasury to repay the interest due on appropriated funds used to finance Corps of Engineers construction of mitigation hatchery facilities on the Lower Snake River, Idaho. These facilities are constructed pursuant to the Lower Snake River Compensation Plan authorized by the Water Resources Development Act of 1976.

1/ Results of modified repayment proposal.

4. Amortization $148,600

This item covers repayments to the U.S. Treasury to pay off the Federal investment in transmission facilities and the power share of the Federal hydro-projects operated by the Corps of Engineers, including hatchery facilities constructed pursuant to the Lower Snake River Compensation Plan. This item also covers repayment of bonds issued in support of conservation, fish and wildlife, and transmission system construction since 1974. (Amortization of Bureau of Reclamation projects is found in the Associated Project Costs program.)

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET
PENDING LITIGATION
BONNEVILLE POWER ADMINISTRATION

I. Supply System Litigation

A. Bonneville Power Administration v. Washington Public Power Supply System, No. C82-1252 (W.D. Wash. filed October 26, 1982) originally filed as Washington Public Power Supply System v. Alder Mutual Light.

This case has become an umbrella or vehicle for several items of litigation not related to the issues in the case as originally filed. Pertinent to this report are: (1) cost sharing (original case); and (2) Investor-Owned Utilities' WNP-3 litigation.

1. Cost Sharing

The Supply System, and the Project participants agreed that the costs of common facilities for the twin plants, WNP-1 and WNP-4, and WNP-3 and WNP-5, should be equitably shared as a means of reducing costs of the projects. Upon termination by the Supply System of Projects Nos. WNP-4 and WNP-5, the participants in those projects have demanded that the costs be reallocated retroactively so that a greater portion of costs will be absorbed by Projects Nos. WNP-1 and WNP-3, the net-billed projects. If the participants are successful this could result in these two net-billed projects assuming additional costs of $192 million to $400 million.

The Department of Justice filed an Answer, Counterclaim and cross-claim. The court has dismissed the Supply System as plaintiff, substituted BPA as plaintiff, and made the Supply System a defendant. The case was assigned to Judge Richard Bilby of Tucson, Arizona. Judge Bilby stayed discovery pending resolution of the mothballing case. Judge Browning has replaced Judge Bilby.

As described in Subsection 2(b) directly below, Judge Browning has vacated Judge Bilby's orders. The Department of Justice has reurged its motion to dismiss the cost-sharing claim pursuant to the procedure established by Judge Browning. By order of July 10, 1985, Judge Browning reinstated all of Judge Bilby's substantive decisions in the cost-sharing case.

2. Investor Owned Utilities/WNP-3 Case

By May 1983 the Supply System was unable to sell bonds to finance the construction of WNP-3. BPA recommended that the Supply System "mothball" or implement an extended construction delay of WNP-3. Because BPA declined to approve proposed Supply System Amended Annual and Construction Budgets providing for BPA to fund completion of WNP-3, the IOU owners of a 30 percent share in WNP-3 filed a motion for a preliminary injunction to compel BPA to proceed immediately with funding completion of that project. The IOUs also filed claims for breach of contract against BPA and the Supply System.

The Supply System invoked a provision in the Ownership Agreement to refer to a Special Board the question of whether BPA's refusal to approve the Supply System's Amended Annual and Construction Budgets was in accordance with prudent utility practice. Even though BPA and the IOUs resisted this procedure, Judge Bilby ordered that board members be nominated in accordance with the provision of the Ownership Agreement and conduct proceedings on this question. The Special Board hearing commenced November 28, 1983 and submitted its report to Judge Bilby on January 6, 1984.

The Board determined that the Supply System was foreclosed from the capital markets in May 1983; therefore, the proposed 3-year slowdown was a prudent utility practice based on the assumption that sufficient funds were not available from other sources to enable the Supply System to continue scheduled construction of WNP-3. The Board's decision left undetermined the question of irreparable harm to the IOUs as a result of the slowdown and the question whether BPA is contractually obligated to fund construction completion under the Net-Billing Agreement and the Project Agreement.

BPA and the IOUs reached agreement on a proposed set of settlement principles, which were announced on January 18, 1985. The guiding principle of the settlement was to put the IOUs in a position similar to what they could have expected had Project 3 not been mothballed. Thus, Bonneville is obligated to deliver an amount of power (expected to be 191 annual average MW) to the IOUs over the expected life of a nuclear power plant (30-32 years). The precise amount of power and its costs to the IOUs will depend upon the performance of four nuclear power plants similar to Project 3 located elsewhere in the country. In exchange for the power, the IOUs will make combustion turbines available for Bonneville's use and give the federal agency an irrevocable offer of their share of the Project. Before BPA can accept that offer it must engage in proceedings mandated by the Northwest Power Act.

The settlement agreement has itself generated a new round of litigation. A group of public utilities, including the City of Tacoma and the large Clark and Cowlitz County PUD's, have insisted the settlement violates a number of Bonneville's statutory obligations and constitutes a breach of the agreements governing Project 3. The settlement agreement contemplated these challanges and provides for severability among its major components. Thus, if, for example, the irrevocable offers of the IOUs project shares are declared invalid, the remainder of the settlement remains in full force and effect. If all the substantive provisions are declared invalid, the convenant not to sue limits the IOUs to action for recission of the Ownership Agreement for Project 3. They have forever waived their rights to money damages from BPA and the Supply System resulting from the mothballing of the plant.

The settlement agreements became effective on December 18, 1985. Judge Browning established a briefing schedule on challenges to the settlement agreements that runs through January 15, 1986.

B. City of Springfield v. Washington Public Power Supply System, 564 F. Supp. 90 (D. Or. 1983) (Springfield III), affirmed, 752 F. 2d 1423 (9th Cir. 1985), petition for certiorari filed August 12, 1985.

This is an action for a declaratory judgment to determine whether the participants in the Supply System's nuclear projects WNP-1, WNP-2, and WNP-3 had legal authority to enter into the net-billing agreements for these projects or, in the alternative, if they were found not to have had the authority, to declare that BPA is liable for the payments and is estopped to claim lack of obligation to do so. The plaintiffs have joined not only the participants in the projects, but also BPA and the IOUs that own a 30-percent share in WNP-3. Also joined are Portland General Electric Company as builder of the Trojan Nuclear Plant and owner of 68.5 percent of Trojan, Pacific Power and Light Company, owner of 1.5 percent of Trojan, and Eugene Water and Electric Board (EWEB), owner of 30 percent. EWEB's interest has been assigned to other utility participants, who, in turn, assigned their shares of the capability of Trojan to BPA.

The District Court held that the participants in the projects had authority to enter into the net-billing agreement. The defendant-intervenors appealed this decision to the Ninth Circuit Court of Appeals.

The Ninth Circuit issued its opinion on February 9, 1985; affirming the District Court's order. The Ninth Circuit issued a clarification of its February order on April 18. The Ninth Circuit denied defendant intervenors' petition for rehearing and rejected their suggestion for a rehearing en banc on May 16, 1985. A petition for certiorari was filed on August 12, 1985.

C. *Benton County PUD v. United States*, No. 590-82-C (Ct. Cl. filed November 18, 1982); *Clallam and Snohomish PUD v. United States*, No. 29-83-C (Ct. Cl. filed January 18, 1983); *City of Tacoma v. United States*, No. 514-83C (Ct. Cl. filed August 2, 1983).

In the Benton County case the plaintiffs, 11 public utility districts in the State of Washington, filed this case to recover damages resulting from their participation in WNP-4 and WNP-5. Plaintiffs allege that BPA induced them to participate in the Supply System's nuclear projects Nos. WNP-4 and WNP-5. They contend that BPA oversold power to its DSI customers and, based on anticipated power demands in the region, the power to be generated by the projects would be needed to meet BPA's commitments to deliver firm power to its preference customers.

Clallam County PUD No. 1 initiated further litigation alleging the same claims stated in the *Benton County* case and alleging additional grounds for relief: breach of contract; unlawful taking of property rights in their preference contracts; breach of preference statutes; failure of BPA to implement an alleged implied obligation to obtain authority from Congress to net bill WNP-4 and WNP-5; and breach by BPA of its oversight duties with respect to WNP-1, WNP-2, and WNP-3.

On August 2, 1983, the City of Tacoma and Nespelem Valley Electric Cooperative, Inc. filed a complaint in the U.S. Claims Court alleging substantially the same contentions contained in *Benton County*.

City of Tacoma and *Benton County* were consolidated August 31, 1983. The Government has filed a motion for summary judgment in both the *Benton County* and *Clallam County* cases seeking dismissal of the actions on the ground that the cases have been rendered moot by the Washington State Supreme Court decision in the *Chemical Bank* case which released the WNP-4 and WNP-5 participants from liability under their agreements on those projects. The cases are on hold until sometime in 1986.

D. *Chemical Bank v. PUD No. 1 of Benton County, Washington, et al.*, No. C83-1080 (W.D. Wash. filed August 3, 1983).

This action was originally filed against more than 600 organizations and individuals, including: (1) the Supply System; (2) all 23 members of the Supply System; (3) all 88 participants in Projects 4 and 5 (which includes 20 of the 23 Supply System members); (4) individual members of the Supply System Board of Directors between 1976 and 1981; (5) individual members of the Projects 4/5 Participants' Committee; (6) individual members of the governing bodies of each of the 88 participants and each of the 23 members; and (7) BPA. Against the non-federal defendants, Chemical Bank (Bond Fund Trustee for Projects 4/5) alleges violations of Federal and Washington State securities statutes, common law fraud and misrepresentation and negligence. The alleged misrepresentations concern the participants' authority to enter into the Participants' Agreements, the need for power from the projects, the ability to market bonds to finance completion of the projects, and the Supply System's inability to construct the projects in accordance with published budgets and schedules.

The claim against BPA was dismissed in December 1983 for failure to file an administrative claim as required by the Federal Tort Claims Act (FTCA). Chemical Bank filed the required claim with BPA and refiled its action against the United States in April 1984. Chemical Bank asserts that BPA was negligent in allegedly planning Projects 4 and 5 and in compiling load forecasts showing a need for the power to be produced from Projects 4 and 5 when in fact there was no such need. It also alleges that BPA failed to warn the Supply System, bondholders and the public of material adverse information it knew regarding construction and financing of Projects 4 and 5. Chemical seeks to recover the principal amount of all outstanding Projects 4/5 bonds, a total of some $2.25 billion. Chemical Bank is also asserting a claim on behalf of the Supply System against the United States to indemnity, to the extent that the Supply System is liable to Chemical Bank on Chemical's claims against it.

In December 1983 Judge Bilby dismissed the individual utility governing body members as defendants, and denied all other motions to dismiss. This case is consolidated with the MDL 551 litigation discussed below.

E. In re Washington Public Power Supply System Securities Litigation, No. 551 (W.D. Wash. filed August 23, 1983). J.P.M.D.L.

This is a consolidated proceeding involving 13 separate class actions brought on behalf of those who purchased Projects 4/5 bonds prior to the termination of the projects on January 22, 1982. Additional lawsuits have been brought on behalf of those who purchased Projects 4/5 bonds during the period from January 22, 1982, until the decision of the Washington Supreme Court on June 15, 1983. The bond purchasers are suing the same defendants as in the Chemical Bank suit as well as the underwriters, attorneys, architect/engineers, financial consultant, consulting engineer and attorneys involved with the participants in the Supply System Projects 4 and 5.

In late 1983 class plaintiffs solicited bondholders to file tort claims against BPA on the alleged grounds that BPA undertook an active role in furthering construction of WNP-4 and WNP-5. Upwards of 15,000 tort claims have been filed against BPA for an amount in excess of $1 billion. Class plaintiffs also filed a claim purporting to represent all simiarly situated bond purchasers. In September 1984, after the six month statutory waiting period passed under the FTCA, class plaintiffs amended their complaint to plead a negligence claim against the United States which is substantially identical to the claim asserted by Chemical Bank and joined as plaintiffs approximately 10,000 individual claimants. Subsequently additional individual plaintiffs have been joined as their six month statutory waiting period passed.

In September 1984 Judge Bilby granted a motion for change of venue filed by the underwriter defendants and supported by the plaintiffs, but the trial site has yet to be determined. It apparently will be selected from among the choices of San Francisco, Los Angeles, San Diego, and Phoenix. On November 9, 1984, a motion to dismiss all claims against the United States in this case and in the Chemical Bank case was filed by the Department of Justice. Oral argument on that motion was heard on April 3, 1985. The Court has not yet ruled on that motion.

No trial date has been set, but a date in early 1987 is likely

In late February and early March 1985, BPA received tort claims from 10 Oregon utilities and 5 Oregon utility managers alleging liabilities arising out of the construction and financing of WNP-4 and WNP-5. Each claim alleges damages of $2.25 billion. Those claims are not yet connected with the MDL 551 litigation, however, they arise from the same factual situation and are likely to become part of this litigation shortly now that the six month period for review of these claims under the FTCA has run.

F. M.G.I.C. Indemnity Corporation v. PUD No. 1 of Benton County, Washington, et al., MDL No. 551, not yet filed.

The plantiff insured the holders of some of the WNP-4 and WNP-5 bonds. Upon the Supply System's default on those bonds the plaintiff paid the insured bondholders for losses. It now seeks to recover those payments from the United States. The complaint is virtually identical to the one filed in MDL 551. The motions filed by the Department of Justice in the MDL 551 litigation (i.e., above) will apply equally to this case.

G. Other Supply System Litigation

In addition to direct claims against Bonneville, there are lawsuits against the Supply System brought by the bondholders and the bond fund trustee, utilities who loaned money to the Supply System to pay for mothballing and termination of WNP-4 and 5, and lawsuits brought by contractors regarding claims for goods and services provided for WNP-4 and WNP-5. Many of these litigants have asserted a right to execute on all the assets of the Supply System including WNP-1, WNP-2 and WNP-3 to satisfy any judgments in their favor. The claims of the bondholders and the bond fund trustee are still in the discovery stage with trial expected in 1987. The Washington Supreme Court has ruled that the utilities who loaned money to the Supply System to pay for the mothballing and termination of WNP-4 and WNP-5 were limited to satisfying their judgment from the funds of WNP-4 and WNP-5. There are five claims by contractors of WNP-4 and WNP-5 being litigated currently by the Supply System. Four of the cases have yet to be tried. The Supply System has appealed the judgment in favor of the contractor in the fifth case.

II. Rates Litigation

A. Public Power Council v. Johnson, No. 83-7850 (9th Cir. filed November 17, 1983).

This case is a consolidation of suits by all BPA customer groups challenging BPA's 1983 wholesale power and transmission rates.

Petitions were dismissed by stipulation because the 1983 rates were not yet final, with the exception of California Energy Commission v. Johnson, Consolidated Case No. 83-7962. Motion for a preliminary injunction in that case was argued September 14, 1984. However, on August 1, 1985 the Ninth Circuit dismissed that case for lack of jurisdiction, because the 1983 rates which it challenged (non-firm/non-regional) were not yet final, and thus not judicially reviewable under the provisions of section 9(e)(5) of the Pacific Northwest Electric Power Planning and Conservation Act. Because the case did not entail extraordinary circumstances which would warrant the exercise of the Court's powers under the All Writs Act, 28 U.S.C. § 1651(a) (1982), the Court declined review. (BPA's 1983 regional wholesale and transmission rates received confirmation and approval by the Federal Energy Regulatory Commission on July 2, 1985.) New petitions for review were filed within 90 days after final FERC approval of the 1983 rates.

B. Kaiser Aluminum v. Johnson, No. 83-7529 (9th Cir. filed July 19, 1983).

In September 1982, BPA's direct-service industrial customers filed the first lawsuit challenging the 1982 wholesale power rates.

This case consolidated 20 suits involving as parties or intervenors all of BPA's investor owned and public utility customers, direct service industries, and members of the Public Power Council, Public Generating Pool, Pacific Northwest Generating Company, California Energy Commission, Association of Public Agency Customers, Pacific Northwest State Commissions, and California Public Utility Commission. Briefing order established. The court granted a stay for six months until April 1985. An additional 6-month stay was granted. The court granted an additional stay until December 1, 1985.

C. Southern California Edison Co. v. FERC, No. 83-155 (D.D.C. filed June 1, 1983).

California utilities challenge FERC's order confirming and approving BPA's 1979 non-firm wholesale power rates. California utilities seek an order declaring that FERC's action was unlawful because it was arbitrary, capricious, an abuse of discretion, and unsupported by substantial evidence.

BPA filed a Motion for Judgment on the Pleadings on March 12, 1984, and a Reply to parties' responses to that motion on June 8, 1984. The motion was denied. Notice of Recent Decision was filed by the Dept. of Justice on behalf of BPA, November 8, 1984. SCE responded on November 23, 1984, and moved on February 19, 1985 to hold in abeyance pending FERC decision or for six months. Motion is still pending.

D. Southern California Edison Co. v. FERC, No. 83-7841 (9th Cir. filed November 14, 1983); Pacific Gas and Electric v. FERC, No. 83-7942 (9th Cir. filed December 14, 1983); Southern California Edison Co. v. FERC, No. 84-7182 (9th Cir. filed March 16, 1984)

These three cases were consolidated. Petitioners petition for review of the FERC promulgation of regulations for the interim and final approval of BPA rates (FERC Order 323). Petitioners argue that the regulations are contrary to the requirements of section 7(k) of the Northwest Power Act as well as the Administrative Procedure Act. Petitioners seek to vacate the regulations and for remand to FERC, attorney's fees and other equitable relief. Southern California Edison challenges FERC's denial of reconsideration of the regulation for interim and final approval of BPA rates.

The court issued an opinion affirming in part, reversing in part, and remanding the case to FERC.

E. Atlantic Richfield Co. v. BPA, No. 83-7971 (9th Cir. filed December 23, 1983). Consolidated with Intalco v. Johnson, No. 83-7981 (9th Cir. filed December 28, 1983).

The DSIs charge that BPA violated the DSI contracts by imposing new curtailment rights and duties on the DSIs with the "customer charge" included in the 1983 DSI rate. The DSIs seek to have the "customer charge" set aside and to recover costs.

Briefing was stayed until April 1985. Respondents' Brief and Motion to Stay and to Consolidate Case Nos. 84-7971 and 83-7981 were filed July 12, 1985. Oral argument was held on December 4, 1985. The court has not yet rendered a decision.

F. Georgia Pacific Corp. v. United States, No. 761-83 (Cl. Ct. filed December 28, 1983)

The Direct Service Industries (DSIs) contend that the 1983 IP-83 rate, which includes a "customer charge", is a violation of the DSI long term contracts which permit only an "energy charge" and a "demand charge". The DSIs seek damages, interest, and attorney's fees.

Stayed until the Arco and Intalco cases are resolved.

G. City of Seattle v. Johnson, No. 83-7947 (9th Cir. filed December 15, 1983) Consolidated with Puget Sound Power & Light Co. v. Johnson, No. 84-7591 (9th Cir. filed September 12, 1984.)

BPA included an availability charge in the PF-83 rate. Petitioners alleged that the inclusion of the availability charge constitutes a breach of the power sales contract with BPA.

BPA filed its brief on December 28, 1984. Public Generating Pool and Puget Power filed reply briefs on January 11, 1985. Oral argument was held on December 4, 1985. The court has not yet rendered a decision.

H. PUD No. 1 of Clallam County, Washington v. Johnson, No. 84-7255 (9th Cir. filed April 18, 1984)

Clallam County PUD and other PUDs filed a complaint seeking declaratory and injunctive relief against BPA. The PUDs challenge BPA's individual average system cost Average System Cost determinations.

Stayed until October 1, 1984. The case will go to brief. Procedural schedule set by Order dated May 13, 1985. Again stayed until December 15, 1985.

I. Public Power Council v. Johnson, No. 84-7564 (9th Cir. filed August 29, 1984)

Petition for review and complaint against action of BPA on account of BPA's legal interpretation of section 7(b)(2) of the Northwest Power Act. PPC claims the interpretation is improper and illegal and seeks an order setting it aside and costs.

BPA filed a motion to dismiss on February 21, 1985. Petitioners have filed a Memorandum in Opposition to the Motion to Dismiss, March 15, 1985. Companion case (84-7772 on Implementation methodology) was dismissed by Ninth Circuit by Order dated May 22, 1985). BPA filed a motion for leave to reply and a reply to PPC's Memorandum in Opposition on May 29, 1985. PPC responded opposing motion for leave to file reply on May 31, 1985. BPA's motion for rehearing was denied. The briefing schedule is not yet established.

J. Pacificorp v. Federal Energy Regulatory Commission, No. 84-7569 (9th Cir filed August 31, 1984.) Consolidated with Pacificorp v. BPA, No. 84-7862 (9th Cir. filed December 21, 1984, and Pacificorp v. Federal Energy Regulatory Commission, No. 85-7103 (9th Cir. filed February 21, 1985).

These consolidated cases challenge the Revised Average System Cost Methodology on the grounds that the methodology was revised before it had been final for one year, and that such revision violates the Residential Exchange Contracts between plaintiffs and BPA. A variety of claims are presented, including a request for declaratory relief for breach of contract, a request for a declaration that Average System Cost revisions were unconstitutionally predetermined by BPA Administrator, and a claim that the Administrator exceeded his authority when the Average System Cost was revised.

On March 1,1985, these cases were consolidated following a Prebriefing Conference on February 26, 1985. Petitioners' Opening Brief was filed on May 1, 1985. FERC's brief was filed on June 14, 1985. Respondent BPA and intervenors filed their briefs on July 1, 1985. Petitioners may reply by July 22, 1985. Petitioners have requested a one week extension. Oral argument was scheduled for September 10, 1985. A decision is pending.

K. California Energy Resources Commission v. Johnson, No. 81-7809 (9th Cir. filed December 4, 1981) (CEC I)

Petitioner, an agency of the State of California, asks the Court to void certain provisions of BPA's Northwest Power Act power sales contracts. Its petition for review contends that certain parts of paragraph 8 of the BPA General Contract Provisions annexed to the Northwest Power Act power sales contracts are illegal and void because they:

> (1) bind BPA to a particular method of wholesale ratemaking without complying with the Northwest Power Act;
>
> (2) establish a rate ceiling on certain firm energy purchases which results in the California utilities being charged a higher rate for nonfirm surplus energy; (3) limit BPA sales outside the region to surplus energy and surplus peaking capacity, thereby perpetuating the "Northwest priority;" and (4) require return of energy delivered in connection with BPA sales of peaking capacity in California to BPA if it has a demand for such energy at any established BPA rate. Petitioner also alleges that since Residential Exchange Contract Provision 4 can result in increasing BPA's cost of service, and as a consequence, the rates paid by California purchasers, it is invalid as violating the requirements of the Northwest Power Act that BPA acquire only those resources that are cost effective.

The Ninth Circuit granted one CEC motion for a time extension to file a brief but denied a second motion for further extension on June 10, 1982. BPA opposed both motions and sought to have the case dismissed for failure to file a brief and for lack of standing. The motion to dismiss for failure to file a brief was denied. The issues of standing and possible sanction against CEC were deferred to the merits panel.

Petitioner's opening brief was found to be seriously defective and the court by order of June 30, 1982, gave petitioner 14 days to correct the deficiencies. Petitioner mailed a motion and corrected brief on July 12, 1982; the court ordered the brief filed over BPA's opposition. CEC Reply brief filed May 13, 1985. Oral argument is completed. A decision is pending.

L. Clearwater Power Company v. Johnson, No. 85-7320 (9th Cir. filed June 6, 1985).

Raft River Co-op v. Johnson (8/20/85 BPA decision); Clearwater Power v. Johnson (9/5/85 BPA decision); Clearwater Power v. Johnson (BPA Doc. No. 26-A3-8401); Clearwater Power v. Johnson (BPA Doc. No. 26-A3-8501); Benton Rural v. Johnson (BPA Doc. No. 33-A2-8401); Umatilla Co-op v. Johnson (BPA Doc. No. 29-A1-8501); Raft River Co-op v. Johnson, No. 85-7519 (9th Cir. filed September 18, 1985); Umatilla Co-op v. Johnson, No. 85-7520 (9th Cir. filed September 18, 1985).

In each case, petitioner, a cooperative/preference customer of BPA, contends that the Administrator improperly interpreted Section 5(c)(7) of the Regional Act and applied the Average System Cost Methodology illegally.

The attorney for petitioners has stated that he may file additional appeals on behalf of other cooperatives. For each of these cases, both filed and not yet filed, petitioner's attorney has expressed petitioner's intent to seek a six-month stay during which to resolve the dispute.

M. City of Idaho Falls v. U.S. Department of Energy, No. 85-7302 (9th Cir. filed May 28, 1985).

Idaho Falls challenges two actions by BPA Administrator. First, Idaho Falls claims that BPA erroneously concluded that BPA overpaid Idaho Falls under the Exchange Transmission Credit Program. Second, Idaho Falls claims that BPA erroneously concluded that its Average System Cost filings were in error. Idaho Falls asks for amounts due plus interest.

Docketing statement filed June 14, 1985. No briefing schedule is yet established.

N. Central Electric Cooperative, Inc., v. Bonneville Power Administration, No. 85-7242 (9th Cir filed April 30, 1985).

Challenges BPA's revision of its February 1, 1985, Average System Cost filing.

Docketing Statement filed May 8, 1985. No briefing schedule is yet established.

O. CP National Corporation v. United States, No. 693-84C (Ct. Cl. filed December 26, 1984).

Plaintiff IOUs sue for breach of contract and money damages, alleging that BPA's revised Average System Cost methodology was untimely and violates its Residential Exchange contracts with plaintiffs.

A stay of proceedings for one year, until February 25, 1986, has been granted upon motion from the U.S. Department of Justice. The purpose of the stay is to await resolution of Pacificorp v. Federal Energy Regulatory Commission, No. 84-7569 (9th Cir. filed August 31, 1984), described in section "O" of this document's section on rate cases.

P. Coos-Curry v. Johnson, No. 85-7339 (9th Cir. filed June 12, 1985).

Petitioner, a preference customer of BPA, contends that the Administrator improperly failed to provide reimbursement to the utility to compensate for the withdrawal of the transformation charge component of BPA's 1979 PF rate.

Parties are awaiting the establishment of a briefing schedule.

III. Power Sales Contracts Litigation

A. Forelaws On Board v. Johnson, No. 82-7319 (9th Cir. filed June 2, 1982).

Petitioners allege BPA should have prepared an EIS prior to initial offer of long-term contracts under Pacific Northwest Power Act § 5(g).

The case was argued before the Ninth Circuit Court of Appeals on March 13, 1984. In an opinion for the 3-judge panel written by Schroeder issued September 25, 1984, the Ninth Circuit ordered an EIS on the contracts but did not enjoin their performance. Respondents petitioned for a rehearing, which was denied January 21, 1985.

A Notice of Intent to prepare an EIS was published in the Federal Register on March 6, 1985 (50 F.R. 9116). Scoping meetings were held around the Region in October 1985. Written comments were received and a mailing list of interested persons has been developed. A summary of the written comments and a status report on the preparation of the EIS will be sent to the mailing list on or about December 2. A "cross-comment" period on the summary of written comments (and on the comment letters themselves) will end on January 31. There will be a scoping meeting on December 19, 1985 from 9:00 am to noon at the BPA headquarters building in Room 464. Scoping continues with a draft Implementation Plan that will be sent to the mailing list in Spring 1986.

B. Department of Water and Power of the City of Los Angeles, et.al. v. United States, No. 181-84C (Cl. Ct. filed May 2, 1984)

On December 16, 1983, The Department of Water and Power of the City of Los Angeles (LADWP) filed suit in U.S. District Court alleging that BPA violated the LADWP-BPA Exchange Agreement by requiring LADWP to deliver obligation energy to BPA at only the Nevada-Oregon border or Mead substation. LADWP sought declaratory relief, injunctive relief and monetary damages.

On February 3, 1984, BPA filed a motion to dismiss for lack of jurisdiction, arguing that jurisdiction was properly in the U.S. Claims Court. On May 2, 1984, LADWP filed an amended complaint in the U.S. Claims Court. Joining with LADWP in the complaint were the cities of Glendale, Burbank and Pasadena. The U.S. filed an answer with the Court on August 16, 1984.

On September 28, 1984, BPA cancelled the LADWP-BPA Exchange Agreement for breach by LADWP over a dispute regarding Intertie access by B.C. Hydro under the Interim Near Term Intertie Access Policy enacted on September 7, 1984. (See LADWP v. BPA, No. 84-7618, infra.) As a result of the cancellation of the agreement which is the basis of the lawsuit, LADWP filed a second amended complaint and the U.S. filed an amended answer and counterclaim.

Settlement negotiations began in June 1985. During the month of August, LADWP returned to BPA the energy that it had kept in September 1984. At this time, the U.S. is filing a motion for dismissal of its counterclaim. Settlement negotiations are continuing and are premised on the execution of a 1986 seasonal sale of capacity to LADWP. The Claims Court has set a new discovery completion date of March 6, 1986.

C. Department of Water and Power of the City of Los Angeles v. Bonneville Power Administration, No. 84-7618 (9th Cir. filed September 20, 1984).

LADWP filed a petition for review of agency action and accompanying motion for stay in opposition to BPA's adoption of the Interim Near Term Intertie Access Policy on an interim basis on September 7, 1984. LADWP contends that BPA lacks statutory authority to allocate Intertie capacity on other than a purely competitive basis or to exclude B.C. Hydro sales from the Intertie under certain conditions. LADWP also contends that the Policy should be set aside because it is arbitrary, capricious and not in accordance with BPA's organic statutes and the antitrust laws.

On November 13, 1984, the Court denied LADWP's motion for stay.

The case was argued before a three-judge panel of Skopil, Goodwin and Kilkenny on January 16, 1985. On April 24, 1985, the Court issued its opinion upholding the Interim IAP specifically and BPA's broad authorities to manage the Intertie in general. The Court ruled that BPA has the authority to allocate Intertie access on other than a purely competitive basis, to reserve Intertie capacity for BPA's present and reasonably foreseeable sales, to provide priority treatment to Northwest utilities, and to use its discretion in determining whether to transmit Canadian-generated power.

LADWP has decided not to appeal the ruling. However, both the California CEC and the California PUC filed motions with the Court to intervene (post-judgment) in the LADWP case for purposes of arguing for rehearing or filing for certiorari, to consolidate the LADWP case with their own Intertie Access Policy challenges, and to stay the LADWP opinion until their own cases are decided. One June 14, 1985, the Court denied all of these motions. BPA has since received a certified copy of the Court's judgment in the LADWP case.

D. California Energy Resources Conservation and Development Commission v. Bonneville Power Administration, No. 84-7836 (9th Cir. filed December 5, 1984) consolidated with Public Utilities Commission of California v. Johnson, No. 84-7838 (9th Cir. filed December 6, 1984)

CEC and CPUC filed briefs attacking the Intertie Access Policy (IAP). Specifically, the CEC/CPUC briefs allege that the IAP is (1) ratemaking, (2) arbitrary and capricious, (3) in violation of BPA's statutory duty to treat all utilities alike, including Canadian utilities, (4) in vioaltion of established principles of antitrust law, and (5) in violation of BPA's duty not to discriminate against new generating resources.

Petitioners' motions to intervene (post-judgment) in the LADWP case (84-7618), to consolidate this case with LADWP, and to stay the opinion in LADWP pending the resolution of this case were denied by the Court on June 14, 1985. Petitioners have filed their opening briefs. BPA will file a motion to dismiss all but the ratemaking issue on December 6, 1985. Petitioners will respond by January 17, 1986.

IV. Miscellaneous Litigation

A. Montana Power Company v. United States, No. 123-82C (Cl. Ct. filed March 4, 1982)

On April 16, 1981, Montana Power Co. (MPC) filed a complaint in Federal District Court (E. D. Wash. No. C-81-195-RJM) against BPA and five utilities. MPC sought retroactive increases in headwater benefit payments under the Coordination Agreement from all the defendants. MPC's claim arose from a retroactive increase in land rentals (approved by FERC), which MPC pays to Indian tribes for use of their land in operating the Kerr Dam and reservoir. BPA had declined to pay the retroactive increase, due to a previous Ninth Circuit decision holding that the Coordination Agreement does not provide for retroactive adjustments to headwater benefit payments. On motion by the United States, this case was transferred to the Claims Court in March 1982. The case remains in Federal District Court with respect to the other defendants.

On cross motions for summary judgment the court decided in Montana Power Co.'s favor on September 24, 1985. A decision on a possible appeal has not yet been made.

B. Public Utility District No. 1 of Clark County v. Johnson, No. 82-7567 (9th Cir. filed October 1, 1982).

Clark County PUD filed a complaint alleging that it entered into a Power Purchase Agreement with the Great Western Malting Company (GWM) to purchase the output of the GWM cogeneration project in reliance upon BPA's representations that BPA would acquire the output of the GWM cogeneration project from Clark County. Clark County alleges that it has been harmed because BPA declined to acquire the project output and the project is not cost-effective for Clark County's own use. Clark County seeks both monetary damages and equitable relief.

Clark County alleges that BPA is liable in tort for misrepresentation, negligent misrepresentation, and tortious breach of statutory duty. In addition, it is alleged that BPA, by failing to acquire this resource, violated the Administrative Procedure Act, section 6(a) of the Northwest Power Act, and section 210 of the Public Utilities Regulatory Policy Act (PURPA 210).

On November 16, 1982, BPA filed an administrative record of the Administrator's decision not to acquire the GWM cogeneration project, including documentation of BPA's entire Request for Resources (RFR) program which formed the basis for the decision not to acquire the project. On March 2, 1983, a pre-trial conference was held with the Court. Questions concerning discovery and the scope of the Ninth Circuit's subject matter jurisdiction over this case were raised and briefed.

Clark County's motion to compel discovery was granted in part, and Magistrate Juba was appointed special master to oversee discovery. BPA's claim of privilege of certain documents was upheld by Magistrate Juba. This ruling was set aside by the 9th Circuit for failure to follow proper procedures. After the privilege was properly re-asserted, the Ninth Circuit denied BPA's claim of privilege. Discussions were initiated to determine whether or not settlement was possible. These discussions have not proceeded. The case is over three years old.

After a one year lapse in prosecution, Clark County recently filed a motion for order appointing a special master and a motion for leave to perpetuate the testimony of a non-party. BPA has filed a responsive pleading to the latter motion and is awaiting the court's decision. BPA's memorandum in opposition to the appointment of a special master is due December 4, 1985.

C. Seattle Master Builders Association v. Northwest Power Planning Council, No. 83-7585 (9th Cir. filed July 29, 1983).

Petitioners, a coalition of homebuilders and residential construction material suppliers filed a Petition for Review of the Northwest Conservation and Electric Power Plan (Plan) adopted by the Council. Petitioners challenge the legality of the Plan's Model Conservation Standards for new housing conservation measures on statutory and constitutional grounds. Petitioners challenge the adoption of the standards for violations of the Northwest Power Act, the Administrative Procedures Act and state and federal environmental law. Petitioners further challenge the Constitutional authority of the state-appointed Council to require BPA, a federal agency, to implement the Council's Plan by asserting that such authority violates the Constitution's Appointments Clause.

The Council argues that the Plan was lawfully adopted. With respect to the Appointments Clause issue, the Council argues that it does exercise significant authority pursuant to Federal law. However, because its members are not Federal officers by the terms of the Northwest Power Act, they do not have to be appointed by the President.

The Federal Government argues that it is not necessary for the Court to decide the Constitutional issue in this proceeding because the Council's authority with respect to BPA's implementation of the standards is clearly only advisory.

Amicus briefs in support of the Petitioners have been filed by Pacific Legal Foundation, Salmon River Electric Cooperative, Idaho County Power & Light and Unity Light and Power.

Amicus briefs in support of the Council have been filed by the City of Tacoma, Northwest Conservation Coalition, the States of Oregon, Idaho, Montana, and Washington, the National Governors' Association, and the California State Energy Resources Conservation and Development Commission.

Oral argument was heard in Seattle, Washington on May 9, 1985. No decision has been rendered to date.

D. Columbia Basin Land Protection Association v. Schlesinger, 643 F.2d 585 (9th Cir. 1981) on remand, Civil No. 76-006 (E.D. Wash.).

This litigation challenged the right of BPA to build the Lower Monumental-Ashe 500-kV line, the purpose of which is to transmit power generated along the Lower Snake River. At issue were (1) the adequacy of BPA's environmental impact statement (EIS), (2) whether the line routing decision was arbitrary and capricious, (3) the necessity for compliance with local land-use regulations, (4) whether an EIS was required for crossing Bureau of Reclamation lands, and (5) whether the Federal Land Policy Management Act permit obligated BPA to meet substantive siting standards of the State of Washington that were more stringent than those of BPA.

The Ninth Circuit Court of Appeals held for BPA on all issues except the one relating to compliance with the more stringent State of Washington siting standards and remanded the case to the District Court for consideration of that issue. The Circuit Court directed BPA to provide information which Washington needs to determine whether BPA has met the State's substantive standards.

The case was left open pending resolution of whether substantive standards exist, and if so, whether there is any conflict with the standards and the transmission line. The State of Washington has found BPA to be in compliance with its substantive standards. Case still pending awaiting action to formally dismiss the case.

E. Confederated Tribes of the Colville Indian Reservation, v. U.S., No. 181-D (ClCt 1951) (This claim was part of a more general claim filed with the Indian Claims Commission in 1951.)

The Colvilles claim compensation for the U.S.' use of its lands for the production of power at Grand Coulee Dam and that this compensation should be an annual charge at least equivalent to the rentals the Colvilles would have received had they licensed the site for development to a non-Federal entity. The U.S. relies upon a superior navigational servitude so that the Colvilles cannot claim compensation for the water flow values of the Columbia River. The Colvilles argue that the navigation servitude is no bar to recovery when they seek compensation under the Indian Claims Commission Act, which authorized recovery on "moral" grounds not cognizable in conventional law or equity. Alternatively, they argue that even if the navigational servitude applies to suits based upon extralegal grounds, they should recover compensation because (1) failure to provide compensation constitutes a breach of the trust relationship that the U.S. has with the tribes and (2) with respect to the Grand Coulee Project, Congress undertook a special obligation to compensate the Colvilles for water flow values.

The U.S. has filed a motion for summary judgment. The Colvilles have filed a cross-motion for summary judgment. Briefing is completed. The Claims Court has not yet set a date for oral argument or rendered a decision.

V. Tort Claims

Numerous tort claims have been filed against BPA which are in litigation. To the extent that any of the plaintiffs obtain monetary damages, no financial impact on BPA will result because any recoveries will be paid out of Department of Justice funds for payment of judgments.

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Operation and Maintenance, Southeastern Power Administration

For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy pursuant to the provisions of Section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southeastern power area, $19,647,000, to remain available until expended.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Southeastern Power Administration
Operation and Maintenance

The goal of the Southeastern Power Administration (SEPA) program is to provide for the transmission and disposition of Federal hydroelectric power in the Southeast in a fair and orderly manner. The power produced by 81 generating units located at 22 hydroelectric projects throughout the Southeast makes an important contribution to the peaking power requirements of the area. A large number of area systems depend upon SEPA power to carry load, provide reserves, and help meet emergency conditions.

The program is structured to encourage widespread use of available Federal power; to make the power available at the lowest possible rates to consumers consistent with sound business principles; to formulate power rates to recover all costs of producing and transmitting power including amortization of capital investment allocated to power over a 50-year period; to give preference in the sale of power to public bodies and cooperatives; to utilize existing area transmission facilities to accomplish transmission of power to customers; to integrate projects to the maximum feasible extent and operate projects to provide maximum power contribution in meeting area power requirements; and to encourage development of additional hydroelectric power projects that are economically and environmentally feasible.

Program accomplishments during FY 1985 include:

- Marketed power produced to 223 wholesale customers in 10 states from 22 operating projects which have a combined capacity of 3,092,375 kilowatts.
- Receipts deposited from power sales in FY 1985 totaled $79,420,314.
- Negotiated and executed new contracts with preference entities and private utilities implementing the new power marketing policy for the ten-project Georgia-Alabama system in the Southern Company service area.
- Completed all administrative activities related to a new long-term written power marketing policy for the Kerr-Philpott System and issued and published the final policy.

Program expectations for FY 1986 include:

- Pursue negotiation or renegotiation of major contractual arrangements in the Georgia-Alabama, (eastern portion) Kerr-Philpott, and Cumberland Systems implementing power marketing policies expected to benefit approximately 250 preference customers.
- Prepare financial feasibility studies of several proposed hydroelectric projects.
- Estimated receipts from power sales are $108,685,000.

Specific objectives for FY 1987 to FY 1990, designed to meet the requirements of Section 5 of the Flood Control Act of 1944, are:

- Negotiate and execute any remaining contractual arrangements for power marketed pursuant to written power policy to existing and additional customers.

- Administer approximately 300 contracts which benefit approximately 500 preference customers in a fair and effective manner that carries out the intent of contract provisions.

- Formulate and obtain confirmation and approval of wholesale power rates for each of Southeastern's systems of projects.

- Seek favorable resolution of pending lawsuits brought against the Department and Southeastern.

- Market on a long-term basis power made available from the Richard B. Russell Project which will add 300,000 kilowatts of pumped storage power, scheduled to begin operation in 1990.

- Prepare analyses of proposed hydroelectric projects to assure that developments are financially and environmentally sound and make maximum use of resources.

- Repayment reform is being proposed as a legislative initiative.

Although funds are included in the budget for operating the power marketing administration in 1987, the Administration will actively seek to privatize these utility systems. Utilities are not normally a Federal responsibility, and non-Federal owners can operate the PMA's as efficiently, or more efficiently, than the Federal Government.

The Administration will pursue privatization through an open process. It will be guided by the following principles: (1) seek a fair return to the Federal taxpayers from the privatization of these assets, (2) recognize the benefits currently enjoyed by existing customers, and (3) recognize and provide appropriate protections for the personnel benefits of Federal employees.

Before implementation of privatization, the Administration will seek the views of, and promote interest among, concerned groups and individuals, including Congressional delegations, State and local official, current customers, the financial community, and public power and private sector energy interests.

It is expected that the Power Administrations will be sold with all the PMA's being transferred from Federal control by FY 1991. In the interim, the FY 1987 budget proposes to modify PMA capital investment repayment practices legislatively, consistent with sound business principles, to protect the interests of the Nation's taxpayers. These modifications require repayment of the unpaid balance of the original Federal investment at a level not less than would be required under a fixed, straight-line amortization schedule for each power investment financed by appropriations and placed in service. This requirement would not apply to irrigation investments. Repayments of principal, if necessary, can be deferred, subject to the same terms and conditions applicable to deferred interest payments, (e.g., current interest rates are used because the deferral helps finance current operations. The impact of this repayment proposal is relatively modest compared to the proposal made last year in the 1986 budget.

Receipts from power sales using revised repayment criteria are estimated at $130,100,000 in FY 1987.

Accomplishment of these objectives will help meet the objectives of pertinent public laws; make an important contribution to the peaking power requirements of the area; contribute significantly to the reliability of a large number of area systems; and provide a significant contribution to the maintenance of the pluralistic power industry and to the area's economic well-being.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
POWER MARKETING - SOUTHEASTERN POWER ADMINISTRATION
(Tabular dollars in thousands. Narrative material in whole dollars

	1985 Approp.	1986 Adjusted Approp.	1987 Base	1987 Request	Request vs Base
Operation and Maintenance					
Operating Expenses . . .	$ 1,904	$ 1,856	$ 1,864	$ 2,031	$+ 167
Purchase Power and Wheeling	33,840	12,879	12,879	19,705	$+6,826
Total, O&M (Program level) ..	$35,744	$14,735	$14,743	$21,736	$+6,993
Deferral applied				-2,089	
New budget authority requested				$19,647	
Staffing Total FTE's	38	40	40	40	-

Authorization: Section 5, Flood Control Act of 1944 (16 U.S.C. 825s)
Section 302 of Department of Energy Organization Act (42 U.S.C. 7152)

SUMMARY OF CHANGES

1986 Adjusted Appropriation	$14,735
Built in increases and decreases:	
Increased rent	+ 8
FY 1987 base	$14,743
Program increases and decreases:	
Operation and Maintenance	
Personnel compensation and related costs	+ 41
Nominal increases in support functions	+ 126
Purchase Power and Wheeling	
Additional contractual requirements	+ 6,826
1987 budget request	$21,736
Deferral applied	- 2,089
1987 new budget authority request	$19,647

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Conference	FTE General Reduction	Adj. Approp. Total
Southeastern Power Administration			
Operation and Maintenance			
Operation Expenses	$ 1,866	$ -10	$ 1,856
Purchase Power and Wheeling	12,879	---	12,879
Subtotal, Southeastern Power Administration	$ 14,745	$ -10	$ 14,735
FTE Reduction	-10	+10	
Use of Prior Year Balances (SEPA)	-14,735	---	-14,735
Total, Southeastern Power Administration	$ ---	$ ---	$ ---

NARRATIVE JUSTIFICATION

This budget request provides for (1) scheduling the generation of power and supervision of power deliveries; (2) purchase of firming energy to meet customer load requirements and payment of wheeling charges for delivery of power over non-Federal transmission lines; (3) administration of contracts for the sale of power and energy, and establishment of rates to assure repayment of power costs; and (4) general administration and support of Southeastern's power marketing program.

The budget proposal provides for the continuation of the basic power marketing program with implementation of announced power marketing policies without new program initiatives.

Southeastern does not own or operate any transmission facilities and carries out its marketing program by utilizing the existing transmission systems of the power utilities in the area. This is accomplished through "wheeling" arrangements between Southeastern and each of the area utilities with transmission lines connected to the projects. The utility agrees to deliver specified amounts of Federal power to customers of the Government, and Southeastern agrees to compensate the utility for the wheeling service performed.

Southeastern's power marketing policies for its respective systems anticipate that all available power, both capacity and energy, will ultimately be sold as peaking power to preference customers to more completely comply with the law, with no sales to the non-preference utilities who provide wheeling services. Southeastern is progressing as rapidly as possible to negotiate and execute contractual arrangements implementing the policies.

Operation and Maintenance..$2,031,000

The request for this activity will continue basic power marketing program activities. The request provides for increases resulting primarily from statutory within grade and Performance Management Recognition System increases, terminal leave payments, additional personnel benefit costs, and from higher administrative costs for support functions.

The activity provides (1) scheduling the generation of power and supervision of power deliveries; (2) administration of contracts for the sale of power and energy and establishment of rates to assure repayment of power costs; and (3) general administration and support of Southeastern's power marketing program.

Southeastern will continue to be engaged in intensive negotiations with wheeling agents and existing and new preference customers to complete marketing arrangements implementing its new final Kerr-Philpott marketing policy in the Appalachian Power Company, Virginia Power, and Carolina Power & Light Company service areas. Similar efforts will be undertaken to implement the Cumberland Basin marketing policy in the Carolina Power & Light (Western Division) and Kentucky Utilities service areas. Southeastern will also analyze the financial feasibility of potential hydroelectric resources in the ten Southeastern states within which Southeastern has marketing responsibility as well as selected projects which have been assigned outside the area.

Southeastern will maintain power billing, collection, and payment functions under approximately 300 contracts which will benefit more than 500 preference customers and will prepare financial and marketing analyses with respect to existing and potential projects. Southeastern will also coordinate power operations of 22 operating projects with 6 Corps of Engineers division and district offices and 19 scheduling utilities. Determinations of capacity and energy availability are made weekly in arriving at quantities available to meet contractual commitments from the various projects. A continuing review of actual project operations is performed to assure that computer models provide reliable data and to assure that maximum production is obtained from the water available.

Southeastern within the provisions of its contracts, is maintaining contacts with the various utilities that it serves to provide delivery of peaking power in advance of entitlement to the extent possible to keep oil-fired generation from being put on line to serve peaking loads or for generation during emergency outages of other equipment. The additional deliveries are accomplished with full cooperation of the Corps of Engineers.

The major portion of the request for this activity provides funding for personnel compensation and related costs and reflects the continuation of the current manpower level of 40 full-time equivalents. Additional power resources from the conventional units at Richard B. Russell project, which began initial generation in January 1985, represents an 11 percent increase in the power to be marketed. Additionally, as a result of changes in the marketing program, SEPA will serve significantly more customers, including individual preference entities benefiting through organizations comprised of many preference entities. These increased customers are served within enlarged marketing areas under new and unique marketing parameters, which impact workload throughout the agency. SEPA will strive to accomplish these workload increases within the current manpower level through improved management of human resources and additional use of automation.

The request of this activity provides for continued replacement of rehabilitation of office equipment which has been in service for long periods of time; provides for equipment additions and associated costs necessary to achieve improved space utilization; and includes minimal additional ADP equipment, software, and associated costs to enhance existing computer support and required to improve billing operations, provide more reliable and timely financial data, and to perform complex technical hydrologial and project operations studies.

Purchase Power and Wheeling..$19,705,000

The request for this activity provides for continued implementation of announced power marketing policies. The requested increase is required for payment of transmission services under contractual arrangements with area utilities with the major portion of the increase required under contractual arrangements with Georgia Power Company.

Funds provided for this activity are used only to pay amounts charged the Government under contractual arrangements for (1) delivery of power over non-Federal systems to load centers of preference customers for the account of the Government, (2) purchase by the Government of energy during adverse water periods, if necessary, and (3) to provide support capacity required to meet commitments for the Jim Woodruff Project under adverse water conditions.

Southeastern has been deeply involved in the development of new written power marketing policies which will allow all available Southeastern power to be marketed to preference customers in the future. These new policies have been implemented as new contracts were executed for the respective marketing areas. Contracts providing for the sale of all power to both existing and new preference customers which are expected to be in effect during FY 1987 cover the following Southeastern sales:

1. That portion of the power produced in the Georgia-Alabama System of Projects to be sold within the Duke Power Company service area.

2. That portion of the power produced in the Georgia-Alabama System of Projects to be sold within the service areas of South Carolina Public Service Authority and South Carolina Electric and Gas Company.

3. That portion of the power produced in the Cumberland River System which is wheeled outside the TVA service area as well as that portion sold within the TVA service area.

4. That portion of the power produced in the Cumberland system and designated to be marketed in the service areas of Carolina Power & Light Company (Western Division) and Kentucky Utilities.

5. Power produced in the Kerr-Philpott System to be marketed in the Appalchian Power Company, Virginia Power, and Carolina Power & Light Company service areas.

Funding is required to pay wheeling charges to transmit power to these preference customers.

Wheeling charges to transmit power to preference customers in the Southern Company Service Area of the Georgia-Alabama System (Georgia, Alabama, Mississippi, and the Panhandle of Florida) will be handled, to the extent possible, by "net billing" with the affected utilities during this period. Decreasing quantities of capacity will be sold to the utilities through May 1991, and charges to the utilities for this capacity will be used to offset charges by the utilities for transmission services provided. The offsetting of respective bills is called "net billing." During 1987 increased funding will be required for payment of transmission services under contractual arrangements with Georgia Power Company, since capacity sales to the Company will be insufficient to fully "net bill" the charges for transmission services provided by that Company.

Additionally, purchase power and wheeling funds are required under the provisions of existing contracts for the sale of power produced at the Jim Woodruff Project and now sold in the Florida Power Corporation service area.

All of Southeastern's costs in the power marketing program are repaid from Southeastern power revenues either through "net billing" or by receipts deposited in the Treasury.

Department of Energy

FY 1987 CONGRESSIONAL BUDGET REQUEST

SYSTEMS STATISTICS

Southeastern Power Administration

	FY 1985 Actual	FY 1986 Estimate	FY 1987 Estimate
Generating capacity:			
Installed capacity (kw)	3,017,375 a/	3,092,375 a/	3,092,375
Peak capacity (kw)	3,231,874	3,300,000	3,300,000
Generating stations:			
Generating projects (No.)	22	22	22
Available energy:			
Energy generated (mwh)	5,581,591	7,700,000	7,700,000
Energy purchased (mwh)	5,573	10,000	10,000
Adjustment for Energy Account (mwh)	661,916 b/	- - -	- - -
Energy available for Marketing (mwh)	6,249,080 c/	7,710,000	7,710,000

a/ Richard B. Russell has four conventional units of 75,000 kw of capacity per unit. Three went on line in fiscal year 1985 and the fourth is scheduled for fiscal year 1986.

b/ Energy was stored in energy accounts maintained with wheeling utilities.

c/ Includes transmission losses of 211,023 mwh. Energy marketed amounted to 6,038,057 mwh.

Department of Energy

FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED, WHEELED, OR EXCHANGED BY PROJECT

Southeastern Power Administration

Project Power Marketed	State	Plants	Installed Capacity (KW)	FY 1985 Actual Power (GWH)	FY 1986 Estimated Power (GWH)	FY 1987 Estimated Power (GWH)
John H. Kerr	Va.-N.C.	1	204,000	285*	440*	440*
Philpott	Va.	1	14,000			
Allatoona	Ga.	1	74,000	3,046*	3,500*	3,500*
Buford	Ga.	1	86,000			
Carters	Ga.	1	500,000			
Clarks Hill	Ga.-S.C.	1	280,000			
Walter F. George	Ga.-Ala.	1	130,000			
Hartwell	Ga.-S.C.	1	344,000			
R. F. Henry	Ala.	1	68,000			
Millers Ferry	Ala.	1	75,000			
West Point	Ga.-Ala.	1	73,375			
Richard B. Russell	Ga.-S.C.	1	300,000 a/			
Jim Woodruff	Fla.-Ga.	1	30,000	227	240	240
Barkley	Ky.	1	130,000	2,480*	3,060*	3,060*
Center Hill	Tenn.	1	135,000			
Cheatham	Tenn.	1	36,000			
Cordell Hull	Tenn.	1	100,000			
Dale Hollow	Tenn.	1	54,000			
Old Hickory	Tenn.	1	100,000			
J. Percy Priest	Tenn.	1	28,000			
Wolf Creek	Ky.	1	270,000			
Laurel	Ky.	1	61,000			
Total, power marketed		22	3,092,375	6,038	7,240	7,240

*Projects are integrated hydraulically, electrically, and financially for marketing purposes.

a/ Richard B. Russell has four conventional units of 75,000 kw of capacity per unit. Three went on line in fiscal year 1985 and the fourth is scheduled for fiscal year 1986.

FY 1987 CONGRESSIONAL BUDGET REQUEST

PENDING LITIGATION
Southeastern Power Administration

ElectriCities of North Carolina, Inc., et al v. SEPA, ET AL., No. 84-2152 (4th Circuit decided March 19, 1985); United States District Court Eastern District of N.C., Civil Action No. 84-625-Civ-5

On June 15, 1984, ElectriCities of North Carolina, Camden and Bennettsville, South Carolina, filed another suit against Southeastern in the U. S. District Court for the Eastern District of North Carolina in Raleigh, North Carolina, seeking a preliminary injunction requiring SEPA to impose market rates on its power sold to existing customers pursuant to its interim Kerr-Philpott policy and to establish an escrow account to retain the difference between SEPA's at-cost rates and market rates for their benefit pending issuance of a final policy. The suit also sought a mandamus to require SEPA to issue a final Kerr-Philpott policy within 30 days. After extensive briefing and oral arguments, the District Court denied the preliminary injunction on August 2, 1984. ElectriCities appealed this order to the Fourth Circuit Court of Appeals and secured an expedited briefing schedule. Oral arguments were presented to a three-judge panel of the Fourth Circuit on January 7, 1985, and on March 19, 1985, the court affirmed the District Court's ruling.

The mandamus issue was fully briefed on cross motions for summary judgment and oral arguments were presented to the district court on February 15, 1985. On June 18, 1985, the court ordered SEPA to formulate and issue a final policy for the Kerr-Philpott system. SEPA appealed the order but fully complied by issuing a final policy on July 18, 1985. Thereafter, on SEPA's motion the Fourth Circuit Court of Appeals ordered on November 18, 1985, the district court to vacate its prior order as moot. On December 3, 1985, ElectriCities filed a motion with the district court to not dismiss the suit, but to retain jurisdiction of the case while SEPA implements the policy and require SEPA to make a report to the court each 90 days on its progress in negotiating the necessary contracts. SEPA has filed briefs opposing this motion and is awaiting a ruling by the court.

United States v. Kentucky Utilities Co., Civil Action No. 81-52 (E.D. Kentucky)

In 1981, the Department of Justice filed this anti-trust action against Kentucky Utilities Company based largely upon KU's refusal to deal with SEPA except under anticompetitive conditions regarding the wheeling of 25,000 kilowatts of SEPA's Cumberland System power to eight Kentucky municipalities located within KU's service area. Coincidentally, SEPA had sought from the Federal Energy Regulatory Commission an order under Sections 211 and 212 of the Federal Power Act requiring KU to wheel power to the municipals but was refused such an order by its final decision of February 3, 1984. The proceedings before FERC were preceeded by some 5 years of unsuccessful negotiations with the company. This action is presently in the discovery stage and being prepared for trial. Although SEPA is not a party to this proceeding, Justice periodically requests assistance and if trial is had SEPA may be called upon for more extensive support.

Southeastern Power Administration, Docket No. EF-86-3011-000 Before the Federal Energy Regulatory Commission.

On October 21, 1985, SEPA received a Protest, Request for Hearing and Motion to Intervene on behalf of ElectriCities of North Carolina, Inc. In SEPA's rate adjustment proceeding seeking approval of proposed rates for its Georgia-Alabama System of Projects (FERC Docket No. EF86-3011-000), ElectriCities protested the rates proposed as invalid, requested a hearing before the commission and for that purpose requested to intervene as a party in the proceeding. ElectriCities, to some extent, duplicated contentions and issues raised by it in a recent suit filed in the Western Division of North Carolina against SEPA and the Southern Companies Power Marketing Policy for the Western Division of the system.

That suit was dismissed by the court on October 31, 1985. ElectriCities variously argues that the proposed rates unfairly discriminate against the Eastern Division preference customers, is in favor of those in the Western Division, that the capacity charges proposed for Duke Power Company preference customers is excessive as compared to charges proposed for other customers, and that the proposed rates are discriminatory as granting certain customers diversity benefits and denied to others. Briefs in opposition have been filed by SEPA and various customer groups in the Georgia-Alabama area and SEPA await a ruling from the commission.

Power Marketing
Southeastern Power Administration - Continuing Fund
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1986 Estimated Budget Authority	FY 1987 Estimated Budget Authority
Continuing Fund		
Emergency Expenses	...	...
Total, Continuing Fund	...	...

Authorization: 16 U.S.C. 825s-2

Continuing Fund

The Southeastern Power Administration Continuing Fund of $50,000, a permanent, indefinite special fund, maintained from receipts for the transmission and sale of electric power in the Southeastern area, is available to defray emergency expenses necessary to insure continuity of service.

DEPARTMENT OF ENERGY

Proposed Appropriation Language

Operation and Maintenance, Southwestern Power Administration

For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy, and for construction and acquisition of transmission lines, substations and appurtenant facilities, and for administrative expenses connected therewith, in carrying out the provisions of section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southwestern power area, [$29,500,000] $25,337,000, to remain available until expended. (Public Law 99-141, making appropriations for energy and water development, 1986.)

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

SOUTHWESTERN POWER ADMINISTRATION - OPERATION AND MAINTENANCE

The goal of the Southwestern Power Administration (SWPA) is to market the power and energy generated at U.S. Army Corps of Engineers' hydroelectric plants in the six-state area of Kansas, Oklahoma, Texas, Missouri, Arkansas, and Louisiana. The power is produced at 23 hydroelectric projects for delivery at cooperatives, municipalities, government installations, and private companies. SWPA provides transmission lines, substations, switching stations, and communication facilities for integration and optimal use of diversity between hydroelectric projects. Transmission and sale of power is available to geographically dispersed customers at rates which fully recover all costs of operation and repay the Government's investment with interest.

FY 1985 accomplishments include

- Progress has been made toward rearrangement of contracts with Oklahoma municipal customers which require purchase power appropriations. Estimated reduction in amounts appropriated for this purpose are expected to be reduced by approximately 40% by end of FY 85.

- Offered a program for SWPA energy conservation workshops to customers in FY 1985.

- Conducted survey to allow customers never before available options in the use of their hydropower, i.e.. a more flexible use of the energy component of their purchases, and a greater availability of this capacity component for other uses such as reserves, diversity of use, and short-term sales to others.

- FERC approval of extensions of both the SWPA Integrated System and Sam Rayburn Dam rates through September 30, 1986.

- Completion of annual power repayment studies for the Integrated System and Sam Rayburn Dam leading to filing and approval of a rate adjustment for SWPA's Integrated System rates effective October 1, 1985, through September 30, 1989.

- Development, filing and approval of a new special Rate Schedule TB for the Town Bluff Dam in Texas. a non-federally financed hydroelectric project.

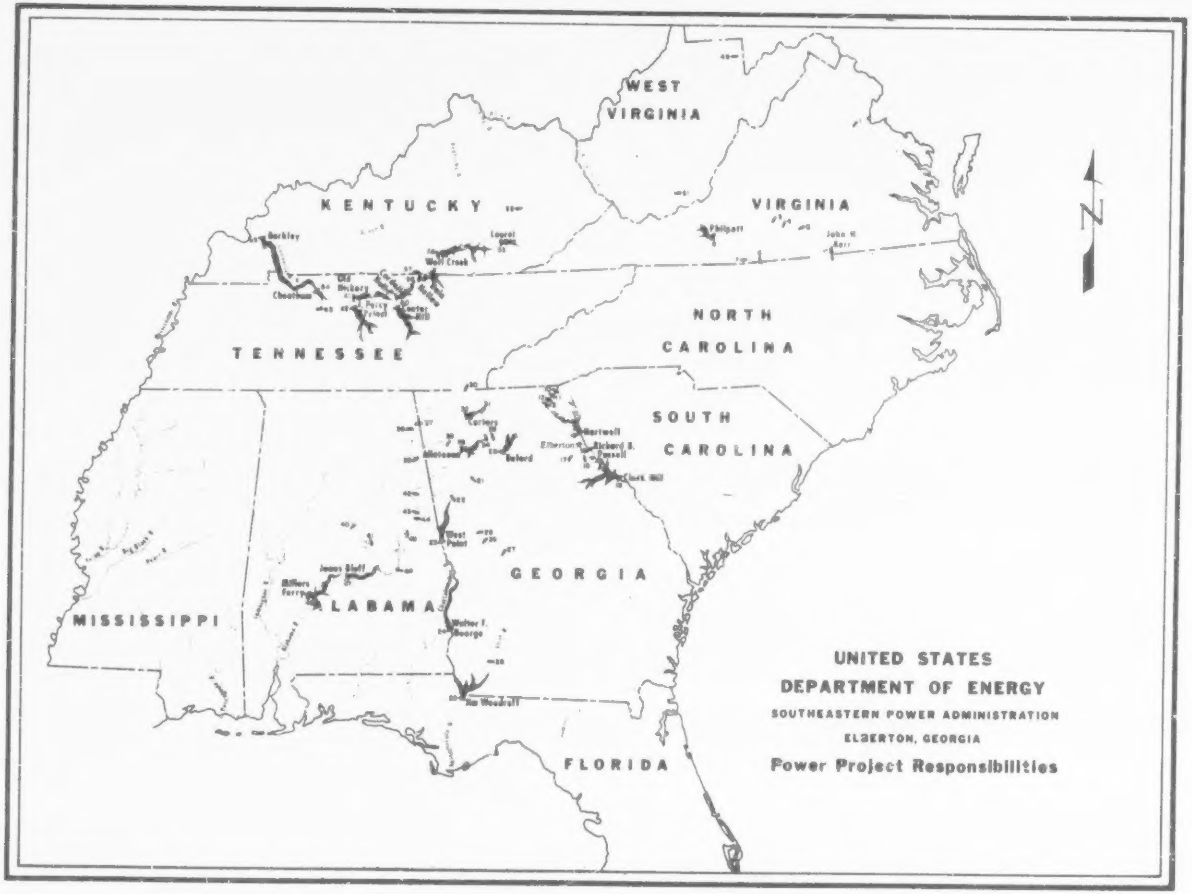
- Development, filing and approval of a new Rate Schedule P4-B to implement special contractual arrangements which significantly reduce SWPA's purchase power budget obligations.

- Continuation of direct involvement in development of an interactive computer repayment analysis model.

- Implemented corrective action identified by a Southeast Missouri-Northeast Arkansas study to meet future agency and customer transmission requirements

- Continued implementation of a major communication system modification program.

- Completed construction of warehouse/office facilities at the Gore and Tupelo, Oklahoma sites.



UNITED STATES
DEPARTMENT OF ENERGY
SOUTHEASTERN POWER ADMINISTRATION
ELBERTON, GEORGIA
Power Project Responsibilities

N
WEST VIRGINIA
KENTUCKY
VIRGINIA
Philpott
John H. Kerr
Barkley
Laurel
Wolf Creek
Cheatham
Old Hickory
Percy Priest
Center Hill
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
Carters
Allatoona
Buford
Hartwell
Elberton
Richard B. Russell
Clark Hill
West Point
GEORGIA
Jones Bluff
Millers Ferry
ALABAMA
Walter F. George
Jim Woodruff
MISSISSIPPI
FLORIDA

- Provided power system improvements with emphasis on increasing system reliability and improving system flexibility for operation.

- Participated in system load flow and reliability studies with the Southwest Power Pool.

Specific objectives for FY 1986 to 1990, formulated in response to Public Laws are:

- Participate in joint transmission planning in Kansas involving WAPA, SWPA, and affected customers and utilities.

- Evaluate the benefits of enhanced tansmission capacity to serve regional needs, and pursue the development of viable opportunities for power and energy exchange without changing the net effect on annual budget appropriations.

- Participate in Oklahoma-Arkansas joint transmission planning to determine future agency and area utility requirements.

- Continue transmission system additions and modifications which are identified through current joint system planning studies of the eastern transmission system and throughout the Arkansas, Oklahoma area.

- Study potential for SWPA or an entity in behalf of its customers to set-up a scheduling agency which would provide a means for various utilities to manage their excesses and shortages in an energy clearinghouse and also for firming up peaking power marketed by SWPA.

- Adopt policy and develop strategies for marketing of power from non-Federally financed hydropower projects.

- Complete annual power repayment studies for the SWPA Integrated System, Sam Rayburn and Town Bluff Dams and file for rate adjustments as necessary to maintain and assure adequate repayment progress.

- Develop policy, criteria and procedures to evaluate the impacts of competing water uses on the existing and planned hydroelectric power facilities.

Accomplishment of these specific objectives will help meet the requirements of pertinent public laws, utilize natural resources, and provide an alternative energy source for meeting the nation's energy needs.

Although funds are included in the budget for operating the power marketing administrations in 1987, the Administration will actively seek to privatize these utility systems. Utilities are not normally a Federal responsibility, and non-Federal owners can operate the PMA's as efficiently, or more efficiently, than the Federal government.

The Administration will pursue privatization through an open process. It will be guided by the following principles: (1) seek a fair return to the Federal taxpayers from the privatization of these assets, (2) recognize the benefits currently enjoyed by existing customers, and (3) recognize and provide appropriate protections for the personnel benefits of Federal employees.

Before implementation of privatization, the Administration will seek the views of, and promote interest among, concerned groups and individuals, including Congressional delegations, State and local officials, current customers, the financial community, and public power and private sector energy interests.

It is expected that the Power Administration will be sold with all the PMA's being transferred from Federal control by FY 1991. In the interim, the FY

1987 budget proposes to modify PMA capital investment repayment practices legislatively, consistent with sound business principles, to protect the interests of the Nation's taxpayers. These modifications require repayment of the unpaid balance of the original federal investment at a level not less than would be required under a fixed, straight-line amortization schedule for each power investment financed by appropriations and placed in service. This requirement would not apply to irrigation investments. Repayments of principal, if necessary, can be deferred, subject to the same terms and conditions applicable to deferred interest payments (e.g., current interest rates are used because the deferral helps finance current operations). The impact of this repayment proposal is relatively modest compared to those proposed made last year in the 1986 budget.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
POWER MARKETING

SOUTHWESTERN POWER ADMINISTRATION - OPERATION AND MAINTENANCE
SOUTHWESTERN POWER ADMINISTRATION - PLANT AND CAPITAL EQUIPMENT

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Approp.	FY 1986 Adj. Approp.	FY 1987 Base	FY 1987 Request	Request vs. Base
Power Marketing:					
Operating expenses	$12,168	$10,874	$11,155	$11,802	$ 647
Purchase power and wheeling	22,400	21,624	21,800	20,959	-841
Construction	3,700	5,456	5,500	5,819	319
Total, power marketing	$38,268	$37,954	$38,455	$38,580	$ 125
Management initiatives	-60	...	...	...	...
Use of prior year balances	-7,000	-8,774	13,243	13,243	...
Total	$31,208	$29,180	$25,212	$25,337	$ 125
Staffing/Total FTE's	186	186	186	186	-

Authorization: Section 5, Flood Control Act of 1944 (16 U.S.C. 825s)

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
POWER MARKETING
(In Thousands of Dollars)

1986 Adjusted Budget Appropriation	$37,954
Built-in increases:	
- Administrative expenses	+ 309
- Pay costs and benefits	+ 192
- 1987 base	$38,455
Program increases and decreases:	
Operation and Maintenance	
- Transfer of prorated FTE from construction	+ 170
- Space rental	+ 51
- Service contracts	+ 708
- Overtime	- 188
- Various expenses	- 94
Purchase Power and Wheeling	
- Reduction of funding to an average water year	- 841
Construction	
- Increased activity in construction projects	+ 319
1987 budget request	$38,580

NARRATIVE JUSTIFICATION

The Southwestern Power Administration (SWPA) operates as a marketing agent to dispose of hydroelectric power and energy produced at Corps of Engineers' dams in a six-state area. The goal of the SWPA program is to provide for the transmission and disposition of power from 23 hydroelectric projects for delivery at the lowest possible rates, consistent with sound business principles, to cooperatives, municipalities, Government installations, and private companies. SWPA provides transmission lines, substations, switching stations, and communication facilities for integration and optional use of diversity between hydroelectric projects and the transmission and sale of power to geographically dispersed customers.

SWPA is responsible for achieving program objectives as follows:

- o Improve efficiency of operations, increase system reliability and enhance productivity.
- o Market power on a basis which maintains an acceptable level of repayment.
- o Emphasize the development of Federal hydroelectric projects that are economically and environmentally feasible.

The total FY 1987 Departmental request for Southwestern Power Administration is $38.6 million, a $.6 million increase over the amount budgeted in FY 1986. This total increase consists of the increases and decreases shown in the following activities.

Operation and Maintenance Activity. . . . . $ 11,802,000
The Departmental request is $11.8 million, a $.9 million increase over the budgeted amount in FY 1986. This increase consists of the following:

Transfer of prorated FTE from construction	$ 170,000
GS Pay raise and associated costs	164,000
Rent	51,000
Service contracts	708,000
Overtime	-188,000
Various expenses	- 5,000

This activity provides for the day-to-day funding of 186 FTE employees and their work activities within the following functions:

1. The Division of Power Marketing includes all power contracting relationships with customers, development of rates for repayment purposes, allocation of power resources in the marketing area, the operation of the SWPA transmission system, the integration of 23 hydroelectric projects with other regional power, and the scheduling and dispatching SWPA's resources to meet load requirements. Activities for achieving program goals are as follows:

   - o Maximizing revenues by having all saleable power under contract.
   - o Increase customer contacts to resolve contract matters in a timely manner.
   - o Continue development of new contractual relationships that may reduce the need for purchase power and wheeling charges.
   - o Continue repayment studies to determine if rates are adequate for repayment of investment.
   - o Review proposals concerning Corps of Engineers multipurpose projects for possible inclusion of power generation.

2. The Division of Power Facilities consists of five Branches: Transmission Lines, Substation, Electronics, Planning and Special Studies, and Engineering Administrative Support, of which the first three have specific responsibilities for all engineering and maintenance activities of the areas implied by their names.

Maintenance functions are performed on 1,390 miles of high voltage transmission lines, 26 sub and switching stations, 46 radio and microwave stations, and maintenance on supervisory control and communication equipment for control of the entire SWPA system and integrated projects.

The maintenance is steadily increasing to accommodate the complexity of the electrical system, the increased maintenance requirements associated with an aging system, and to allow energy load carrying growth requirements to accommodate system interconnections with customers and area utilities. This activity, in addition, performs preventive and remedial maintenance on the components of the power system with efforts largely concentrated on replacement of deteriorated transmission poles and crossarms, uprating and replacement of undersized equipment, and servicing transformers, oil circuit breakers, and protective metering on communication systems.

Brush control efforts are performed by each area's maintenance workforce in addition to transmission line, substation and control system maintenance. Each area maintains a brush control program of SWPA's transmission rights-of-way, in order to preclude system power outages due to trees reaching energized lines, with each line being recleared on a three-year cycle. A portion of the right-of-way clearing and the structure/pole inspection is contracted to private industry. The maintenance of the transmission line rights-of-way also includes fence gates, access roads, and the protection and preservation of the environment in accordance with the National Environmental Policy Act (P.L. 91-190).

The program goal in line and substation maintenance is to provide required activities which insure continuous, reliable, economic, safe and efficient delivery of power to customers. This goal is accomplished by the application of the latest technological standards in the performance of preventive maintenance on the transmission system. Specific activities include:

- Monthly inspections of all radio/microwave and substation/switching stations to insure proper operation and correct minor defects of various equipment.

- Internal inspections of circuit breakers and transformers based on results of dielectric and combustible gas tests.

- Constant program of relay and metering testing based on power sales contracts and severity of interruptions.

- The continued programs of safety, switching certifications, and vehicle inspections.

- Meter and relay replacements or additions based on contract changes, obsolescence, load shifts and interconnecting criteria.

- A program of circuit breaker and switch replacement to prevent overloading or inadequate interruption capability based on load flow and fault studies.

- A program of air conditioning replacement for equipment 10 years or older where parts are obsolete or energy conservation can be improved.

The Southwestern communications system includes voice, telemetering, and the computer based Automatic Generation Control and Supervisory Control and Data Acquisition (AGC/SCDA) system. These facilities operate on power line carrier, VHF and UHF radio, leased telephone circuits, and space on equipment owned by others.

Planning and Special Studies provides power system analysis reviews to assure a transmission system adequately rated to provide dependable and reliable delivery of power to SWPA's customers. Tasks to accomplish agency goals are as follows:

- Participate in load flow studies with the Southwestern Power Pool.
- Perform short circuit, stability and load flow studies.
- Provide a comprehensive review of existing system conditions to FY 1991 to enable Planning, Programming and Budget System achievement.

Engineering Administrative Support provides administrative personnel, clerical, and logistical support for the Division of Power Facilities. To accomplish program goals the following tasks have been established:

- A continuous review of warehouse stock items for possible reduction of stock and the related dollar value of warehouse inventories.
- A program to increase turnover ratio output to a minimum of 1:1 annually.
- An ongoing program to continually upgrade and improve support in all areas through continued employee training courses.

3. Division of Administrative Management includes SWPA's fiscal responsibilities, which are segregated into the areas of Procurement and Property Management, Financial Management, Data Processing and Administrative Services. Tasks to support program goals are as follows:

   - Vulnerability assessments and internal control reviews are performed to prevent waste and abuse in the operating systems.
   - Modernization of data processing systems.
   - Review SWPA accounting manual to conform with DOE directives.
   - Review management files for conformance with DOE and National Archives policies.

4. Office of the Administrator includes the Chief Counsel, Public Affairs, and Human Resources Office, which includes Personnel, EEO, Safety and Occupational Health activity.

Purchase Power and Wheeling Activity.........................$ 20,959,000
The Departmental request is $21.0 million a $.6 million decrease under the budgeted amount in FY 1986. This decreased amount will provide for the purchase of power and energy for an entire year of average water operation.

This activity provides for the funding of estimated amounts of energy purchases necessary to meet Government's commitments to utility customers sales contracts. In this regard, the hydro energy marketed by Southwestern must be supplemented by energy purchases to enable Southwestern to fulfill it's contractural obligations, particularly, under adverse, low water conditions. Further, Southwestern has other contractural arrangements to deliver power and energy to customers not directly connected to its transmission system and to pay resulting transmission wheeling expenses. None of Southwestern's energy purchases are discretionary; however, water conditions affect whether additional hydro energy can be generated to meet the obligation or energy purchases required.

Southwestern's projection of its needs for FY 1987 Purchase Power and Wheeling Budget Authority is based on meeting its customers' contractual requirements under average year water conditions. Estimates of Purchased Energy needs for budgetary purposes are based on a variety of continually changing elements. Among these elements are: (1) unit prices for direct purchased energy (generally based on fuel costs); (2) availability of banking arrangements to mitigate these costs; (3) quantities of energy needed to fulfill customer needs (both direct and borderline); and (4) unit prices and transmission rates for borderline purchases which are affected by both fuel costs and rate increases proposed by companies providing supplemental energy.

Purchase Power and Wheeling - FY 1987
(thousands of dollars)

	Water Conditions	
	Average	Critical
A. System Support Requirements		
Arkansas Electric Cooperative	1,110	2,775
Associated Electric Cooperative	534	1,335
Oklahoma Companies	1,960	4,899
Springfield, Missouri, City Utilities	639	1,598
Western Area Power Administration	1,011	2,529
Western Farmers Electric Cooperative	962	2,406
Other Companies (4) and Municipals (4)	808	2,019
Subtotal	7,024	17,561
B. Other Contractual Requirements		
Oklahoma Municipal Power Authority - Wheeling	1,072	1,072
Oklahoma Companies - Wheeling	1,820	1,820
- Energy	10,058	10,058
Associated Electric Cooperative	964	964
Western Area Power Administration	21	21
Subtotal	13,935	13,935
Total Purchase Power and Wheeling Activity	20,959	31,496

Southwestern continues to convert expiring contracts from high energy commitments to lower energy commitments, thus reducing the Purchase Power and Wheeling budget levels while at the same time reducing revenues to be received by the Government. In FY 1987 the effect of this conversion is a reduction of about $7 million in average year budget requirements. In subsequent years, increasing unit fuel costs more than offset the reductions resulting from the lower energy commitments However the projected annual needs for funds in FY 1991 is approximately $10 million less than could be expected without this action. Southwestern has also pursued conversion of certain other contractual arrangements which require Southwestern to purchase energy from the Oklahoma Companies to meet customer loads, and receive reimbursement of such costs from the customers. While such an arrangement produces no net costs for the Government, Southwestern must request appropriated funds. A concerted effort is being made to provide for direct payment by the customers to the Oklahoma Companies to reduce budgeted fund In FY 1987 this conversion will result in a decrease of about $8 million and by FY 1991 a savings of about $11 million is expected. The total reductions from these two actions is $15 million in 1987 and over $ 20 million by FY 1991. Southwestern will continue efforts to derive new ways of reducing budget requirements and to reduce exposure to supplemental appropriation requests.

	Fiscal Years							
	1984	1985	1986	1987	1988	1989	1990	1991
Contracts:								
a. Direct High Load Factor (No.)	14	13	6	5	2	0	0	0
b. Borderline High Load Factor (No.)	22	21	9	9	9	9	9	9
c. Low Load Factor (No.)	66	66	85	81	84	86	86	86
Purchases (Average Year):								
System Support:								
d. With Conversion* - GWH	330	311	250	194	181	178	178	178
e. - $ Millions	11.0	9.7	8.4	7.0	7.1	7.4	8.0	8.5
f. Without Conversion* - GWH	384	384	384	384	384	384	384	384
g. - $ Millions	12.8	11.9	12.9	13.9	15.0	16.1	17.2	18.4
h. Reduction - $ Millions (item g - item e)	1.8	2.2	4.5	6.9	7.9	8.7	9.2	9.9
Other Contracts:								
i. With Conversion** - $ Millions	17.4	16.2	12.8	13.9	14.9	15.7	16.6	17.7
j. Without Conversion** - $ Millions	17.4	18.1	20.0	22.0	23.5	24.9	26.5	28.3
k. Reduction - $ Millions (item j - item i)	0	1.9	7.2	8.1	8.6	9.2	9.9	10.6
l. Total Reduction - $ Millions (item h + item k)	1.8	4.1	11.7	15.0	16.5	17.9	19.1	20.5

* Conversion of high load factor contracts (over 1200 hours) to low load factor contracts (1200 hours per year).

** Conversion of borderline contractual arrangements to provide for direct payment by customers to the suppliers under these arrangements.

Construction Activity..$ 5,819,000

The Departmental request is $5.8 million a $.4 million increase over the amount budgeted in FY 1986. This increase is reflected in the following activity breakdown.

This activity provides for the construction and or modification of new or existing transmission, substation, and switching facilities to transmit power generated at Corps of Engineers' hydroelectric projects in the Southwest.

Major portions of the Southwestern Power Administration (SWPA) transmission system have been in operation for most of four decades. While the system was adequate for many years, continued load growth is forcing equipment to be stressed beyond design limits. Operating as a member of the Southwest Power Pool (SPP), SWPA must continually be alert to the adequacy of its system in mutual support of consumers in the region as well as support to other regions of the nation in times of emergency. This budget activity is designed to continue the fulfillment of this obligation.

CONSTRUCTION PROJECTS JUSTIFICATION
FY 1987

Communications and Control Improvements $ 504,500 - These modifications provide for the construction of minor changes in the SWPA communications system. This includes known equipment change out made necessary by increased loadings and system deterioration as well as unforseen requirements as necessitated by operating as a member of an interconnected power pool.

The SWPA communication facilities transverse large portions of three states. These facilities are composed of power line carrier, VHF and UHF radio, leased telephone circuits and space on equipment owned by others all of varying age and condition. The continued integration of SWPA's transmission lines with other utilities, in addition to the operating and control data required by dispatchers, mandate an extensive and reliable communication system These funds will provide for the systematic improvement to the communications system.

Requested funds will also provide for modifications and additions to the metering, telemetering, and load frequency control facilities. Changes in contractual arrangements by customers and other interconnected utilities can be expected. These changes frequently require circuit revisions and equipment additions.

Specific cost estimates assigned to the above work are as follows:

- Miscellaneous metering and telemetering changes in communication requirements to accommodate power sales contracts. Ten changes at $ 5,000/change. ($ 50,000)

- AGC/SCADA System modifications will include the addition of a RTU at $ 100,000, the expansion of existing RTU's, and the reprogramming of the master computer to accommodate continuing system changes - $69,500 ($169,500)

- Telephone and telemetering expansion and interfere changes to existing communication systems. ($ 80,000)

- Service contracts will include engineering support services - $130,000; equipment maintenance-AGC - $75,000. ($ 205,000)

System Metering, Relaying, Equipment and Materials $ 1,426,000 - These items enable replacement of equipment which is underrated, worn out, deteriorated, or damaged. This equipment includes insulators, and protective equipment with insufficient load carrying ability, and diagnostic tests.

The substation equipment purchases are required to enable preventive and remedial construction of the high-voltage power system which insures uninterruptable, safe, and reliable delivery of electric energy to SWPA's customers.

Requested funds will also provide for modifications and additions to the protective relaying facilities $ 72,000, and metering facilities $ 40,000. Changes in contractual arrangements by customers and other interconnected utilities can be expected. These changes frequently require circuit revisions and equipment additions $ 100,000. ($212,000)

Continued growth plus additional interconnections has resulted in the busses, oil circuit breakers, and switches reaching their maximum capacities at some substations. Serious damage to other equipment installed 30-35 years ago is occurring and replacements are required. These funds will provide circuit breakers for installation at the substations $ 350,000. Potential transformers will also be added at the Paragould, Kennett, and New Madrid Substations for improved reliability $ 150,000. ($ 500,000)

Funds are to provide for engineering services in conjunction with substation modifications as previously outlined. Projects would include the design of new transmission taps and substations, land surveys, environmental assessments, design of relay control circuits and similar modifications to the electrical system ($ 200,000).

Renovation of Maintenance crew and storage buildings built in the early 1950's will allow extension of service life ($ 100,000).

Support materials and parts, transportation, per diem, and personnel compensation to allow accomplishment of the above work is estimated at ($ 414,000.)

Transmission Line Improvement - 391 $ 268,000 - This requirement provides for the replacement of 30 to 40 year old existing deteriorated, or damaged transmission line equipment; minor modifications to the transmission system necessitated by increased loading and interconnected power pool operations; and modifications of the transmission facilities for the convenience of others such as highways, cities, or developers. In most instances, modification for the convenience of others are on a reimbursable basis but require an actual expenditure of appropriated funds.

Specific cost estimates assigned to this work are as follows:

- Transmission system modifications due to interconnection or operational requirements changes. ($ 150,000)
- Support services contracts, engineering design support, and construction inspection. ($ 118,000)

General Plant and Capital Equipment Not Related to Construction $ 1,748,400 - This requirement is comprised of parts, test equipment, and vehicles required in providing maintenance of SWPA's power system. These items enable replacement of similar equipment which is underrated, worn out, deteriorated, or damaged. This equipment includes transmission line wood poles, hardware, crossarms, and insulators, trucks, and specialized maintenance vehicles, protective equipment with insufficient load carrying ability, diagnostic test, and electronic equipment. This equipment is located at the warehouse locations in Arkansas, Missouri, and Oklahoma.

The line, substation, and electronics equipment purchases are required to enable preventive and remedial maintenance of the high-voltage power system which insures uninterruptable, safe, and reliable delivery of electric energy to SWPA's customers ($ 366,500).

Vehicles, tractors, trailers, and equipment necessary in the performance of system operation and maintenance functions which are scheduled for replacement are in accordance with DOE and GSA usage and replacement guidelines. Vehicles and equipment replacement occurs on a cyclic basis ($ 682,900).

Test equipment scheduled for replacement includes specialized or unique equipment to perform diagnostic test on new technology electronic equipment as well as replacing worn out test equipment primarily for substation and communications work ($ 249,000).

Dynamic mapboard for Springfield, Missouri Operations Center will provide a complete view of the entire power system status. All dispatch center personnel can observe the state of the power system configuration simultaneously in times of crises ($ 450,000).

One Time Construction Projects $1,872,000 - Station Additions - This requirement provides for additions to substations and switching stations to accommodate power system growth of Southwestern as well as interconnected utilities. Increasing customer loads

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Conference	FTE General Reduction	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
Southwestern Power Administration						
Operation and Maintenance	$10,974	$ -11	$ -89	$10,874	$ ---	$10,874
Purchase power and wheeling	21,800	---	-176	21,624	-8,774	12,850
Construction	5,500	---	-44	5,456	---	5,456
Subtotal, Southwestern Power Administration	$36,274	$ -11	$ -309	$37,954	$-8,774	$29,180
FTE Reduction	-11	+11	---	---	---	---
Use of Prior Year Balances (SWPA)	-8,774	---	---	-8,774	$+8,774	---
Total, Southwestern Power Administration	$29,489	$ ---	$ -309	$29,180	$ ---	$29,180

and system usage require equipment changes and additions to insure sufficient reliability and protection of the power system. Specific projects are:

Clarksville Substation - This addition includes facilities to enable direct power service to the City of Clarksville, Arkansas. Existing conditions of service are becoming inadequate due to load growth in Clarksville area. Switching of the Clarksville load to our system alleviates this problem, postpones an OG&E investment necessary to support the area power system, and costs would be fully recovered by interconnection is $ 1,600,000. Of this estimate $ 950,000 would be Clarksville's share and reimbursed to the U.S. Treasury. ($ 1,600,000)

Ash Flat Capacitors - This addition is required to maintain acceptable voltage levels on the Norfork to Water Valley transmission line. The project was identified as a least cost alternative in the Southeast Missouri Northeast Transmission Study conducted with area utilities and cities in FY 1984. Estimated cost for this project is ($ 272,000).

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST

PENDING LITIGATION

SOUTHWESTERN POWER ADMINISTRATION

The City of Fulton, Lamar and Thayer, Missouri v. United States of America, No. 84-1725

The Cities listed in the style of the case are all customers of SWPA. In an action filed with the Court of Claims (now the Claims Court) on September 18, 1980, the Cities challenged the authority of the Secretary of Energy to place rates for hydroelectric power into effect on an interim basis. The Cities have paid the rates under protest pending the outcome of their action. They asked the Court to order the United States to refund the rates collected under the interim rate order. On May 19, 1982, the Court entered judgment for the Cities on the issue of liability. Subsequently the Cities and the United States stipulated to damages in the following amounts:

City of Lamar	$627,128.55
City of Thayer	$ 95,442.22
City of Fulton	$232,245.44

The United States appealed the May 19, 1982, Order to the Court of Appeals for the Federal Circuit in Washington, D.C. The Court of Appeals affirmed the Court of Claims Order. The United States petitioned the United States Supreme Court for Writ of Certiorari. The Court granted the petition on July 1, 1985. A hearing has not yet been docketed.

Cherokee Nation of Oklahoma v. United States, C. A. No. 83-306-C

In accordance with the provisions of a private bill, the Plaintiff filed suit against the United States on May 23, 1983. Plaintiffs claim ownership of the bed of the navigable portion of the Arkansas River within the State of Oklahoma. The United States received an unfavorable decision on June 6, 1984. This case is presently on appeal to the Tenth Circuit, Court of Appeals, in Denver, Colorado. In its action the Plaintiff does not claim an amount certain. However, the Corps of Engineers has built three locks and dams on the disputed portion of the Arkansas River. Two of these three projects contain power generating facilities. Damages recovered by the Plaintiff could be $177 million. It cannot be said with any assurance what the outcome of this action will be.

Brazos Electric Power Cooperative, Inc. v. United States of America, C.A. No. W-84-CA-101

On May 30, 1984, the Plaintiff power cooperative (Brazos) filed its Complaint against the SWPA. In this action Brazos asked the U.S. District Court for the Western District of Texas, Waco Division, to declare unlawful SWPA's Final Power Allocation. The Plaintiff, a power customer of SWPA, also requested the Court to declare null and void contract between SWPA and two other customers, Tex-La of Texas Electric Cooperative, Inc. (Tex-La of Texas) and Rayburn Country Electric Cooperative, Inc. (Rayburn Country). Brazos also asked the Court to declare null and void any and all contracts between SWPA and Texas Utilities Electric Company. This action was prompted by the Final Power Allocation mentioned above. Tex-La of Texas and Rayburn Country received as their allocation the output of Denison Dam. Although it did not participate in the Final Power Allocation process, Brazos believed it should share in the output of the Denison Dam project. The Plaintiff did not claim a sum certain in its Complaint. A hearing on Joint Motions For Summary Judgment was conducted on August 13, 1985. On December 27, 1985, the Court ruled in favor of the United States by granting the Defendants' Motion for Summary Judgment.

Leamons and Hazard v. United States of America, C. A. No. LR-C-84-696.

On August 2, 1984, Clyde Leamons and Michael Hazard, the Plaintiffs, filed a Complaint in the U.S. District Court for the Eastern District of Arkansas, Western Division in Little Rock, Arkansas. In this action the Plaintiffs seek $1,000,000 each, an aggregate sum of $2,000,000, for bodily injuries the Plaintiffs claim they sustained while working beneath a high-voltage transmission line owned, operated, and maintained by SWPA. An Answer to the Complaint was filed in a timely fashion and some Discovery has been made. The matter, however, has not yet been docketed for trial. It is too early to say with any assurance what the result of this action will be.

Henry Baugh, et al. v. United States of America, C. A. No. 392-85C

On July 1, 1985, the wage-grade employees of the Southwestern Power Administration filed this action in the United States Claims Court. In their Complaint the Plaintiffs challenge the applicability to Public Law 97-35, which imposed a pay cap on the salaries of Federal employees. Plaintiffs allege that the provisions of said public law should not be applied to their wages. The United States filed its Answer on September 30, 1985. A hearing has not yet been docketed.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED, WHEELED OR EXCHANGED BY SYSTEM

SOUTHWESTERN POWER ADMINISTRATION

System	State	No. of Plants	Installed Capacity (KW)	1985 Actual Pwr (GWH)	1986 Estimated Pwr (GWH)	1987 Estimated Pwr (GWH)
Power Marketed						
(Interconnected System)	Missouri	4	463,200	3,719	2,038	1,921
	Arkansas	9	1,021,050	1,281	899	670
	Oklahoma	7	514,100	1,143	1,338	1,444
	Texas	2	100,000	551	490	516
	Louisiana	---	-	434	340	407
	Kansas	---	-	344	256	336
Subtotals		22	2,098,350	7,472	5,361	5,294
Isolated						
Sam Rayburn Project	Texas	1	52,000	49	57	57
50% to TX; 50% to LA	Louisiana	---	---	49	57	57
Subtotals		1	52,000	98	114	114
Total, Power Marketed		23	2,150,350 1/	7,570	5,475	5,408
Power Exchanged				135	125	97
Power Wheeled (Megawatts)				455	469	485

1/ Includes additional capacity of 80,000 kW from Harry S. Truman assumed to be available in FY 1987.

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
SYSTEM STATISTICS

SOUTHWESTERN POWER ADMINISTRATION
(In thousands of dollars)

	1985 Actual	1986 Estimate	1987 Estimate
Generating Capacity:			
Installed Capacity (KW)	2,043,700	2,043,700	2,150,400
Peak Capacity (KW)	2,071,000	2,053,700	2,133,700
Generating Stations:			
Generating Projects (No.)	23	23	23
Substations/Switchyards (No.)	26	26	26
Substations/Switchyards (KVA Capacity)	928,800	968,800	968,800
Available Energy:			
Energy Generated (Megawatt-Hours)	8,613,800	5,029,700	5,029,700
Energy Purchased (Megawatt-Hours)	249,700	637,300	580,500
Energy Available For Marketing (Megawatt-Hours)	7,570,000	5,474,900	5,407,900
Transmission Lines (Circuit Miles):			
161 KV	1,127	1,127	1,127
138 KV	164	164	164
69 KV	99	99	99
Total Circuit Miles	1,390	1,390	1,390
Revenues:			
Adjusted Gross Power Revenues a/	110,900 (E)	95,400	105,800
Prior year Adjustment	-	-	-
Total Power Revenue	110,900	95,400	105,800
Federal Investment Allocated to Commercial Power:			
Generation Equipment	772,100(E)	858,400	858,400
Transmission Facilities	68,200	72,900	73,300
Total Investment	840,300(E)	931,300	931,700

a/ Includes power sales, wheeling and other revenues.

(E) ESTIMATE - Actual year data not available

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

WESTERN AREA POWER ADMINISTRATION

VOLUME 5

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DEPARTMENT OF ENERGY

Proposed Appropriation Language

Construction, Rehabilitation, Operation and Maintenance, Western Area Power Administration

(Including Transfer of Funds)

For carrying out the functions authorized by title III, section 302(a)(1)(E) of the Act of August 4, 1977 (Public Law 95-91), an other related activities including conservation and renewable resources programs as authorized, including official reception and representation expenses in an amount not to exceed $1,500, the purchase of passenger motor vehicles (not to exceed [18] 4 for replacement only), [$196,610,000] $236,846,000, to remain available until expended, of which [$189,619,000] $214,835,000, shall be derived from the Department of the Interior Reclamation fund: Provided, That the Secretary of the Treasury is authorized to transfer from the Colorado River Dam Fund to the Western Area Power Administration [$890,000] $3,463,000, to carry out the power marketing and transmission activities of the Boulder Canyon project as provided in section 104(a)(4) of the Hoover Power Plant Act of 1984.

[Notwithstanding provisions of title 5, United States Code, except for section 5308, no funds approved for Western Area Power Adminsitration shall be used to pay the rates of basic pay and premium pay for power system dispatchers unless such rates are based on those prevailing for similar occupations in the electric power industry.] (Public Law 99-411, making appropriations for energy and water development, 1986.)

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY
WESTERN AREA POWER ADMINISTRATION
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
(In thousands of dollars)

	FY 1985 Actual		FY 1986 Estimate		FY 1987 Request	
	BA	BO	BA	BO	BA	BO
Construction, Rehabilitation, Operation and Maintenance	$218,230	$189,957	$195,842	$268,938	$240,309	$281,709
Current Authority	---	---	(194,952)	(268,048)	(236,846)	(278,246)
Permanent Authority	---	---	(890)	(890)	(3,463)	(3,463)
Total	$218,230	$189,957	$195,042	$268,938	$240,309	$281,709

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
AMOUNTS AVAILABLE FOR OBLIGATION
WESTERN AREA POWER ADMINISTRATION
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
(In thousands of dollars)

	FY 1986	FY 1987
Appropriation	$195,842	$240,309
(Current Budget Authority)	(194,952)	(236,846)
(Permanent Budget Authority)	(890)	(3,463)
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	67,660	43,538
Unobligated Balances, End of Year	-43,538	0
Offsetting Collections from Federal Funds	20,000	9,000
Total, Obligations	$239,964	$292,847

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW
WESTERN AREA POWER ADMINISTRATION
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

The Western Area Power Administration (Western) was created by Section 302 of the Department of Energy Organization Act of 1977 (Public Law 95-91). Paragraphs (1)(E) and (1)(F) of Section 302 transfer to the Secretary of Energy the power marketing functions of the Bureau of Reclamation (BuRec), including the construction, operation and maintenance of transmission lines and attendant facilities; and the transmission and disposition of electric power and energy generated at Falcon Dam and Amistad Dam, international storage projects on the Rio Grande River.

Western's statutory authority regarding marketing and transmission systems has its origin in the body of law developed over the last century and commonly known as Federal Reclamation Law which is based on the Reclamation Act of 1902, as amended and supplemented. This Act forms the basis for most of Western's activities. However, subsequent Acts, particularly the Reclamation Project Act of 1939 and the Flood Control Act of 1944, have set forth the conditions under which Federal power can be marketed.

In the marketing of power, one of the most important conditions or limits has been the preference concept. The preference clause which has current application is found in Section 9 of the Reclamation Project Act of 1939 and states:

> ". . . in said sales or leases preference shall be given to municipalities and other public corporations or agencies; and also to cooperatives and other nonprofit organizations financed in whole or in part by loans made pursuant to the Rural Electrification Act of 1936 and any amendments thereof."

In accordance with Section 9 of the Reclamation Project Act of 1939, power sales are made at rates which will produce revenues that are sufficient to cover appropriate shares of the annual operation and maintenance cost, interest on the construction investment, and various other fixed charges. Thus, virtually all expenditures that Western incurs are recovered and returned as receipts to the U.S. Treasury. Departmental policies and specific project authorization acts provide for repayment periods and interest rates.

As an administration within the Department of Energy, Western is subject to all laws applicable to Federal agencies. Those that are especially noteworthy with respect to the marketing and transmission of Federal power are the Administrative Procedures Act and the National Environmental Policy Act.

Alternatives to Federal operation and management of the present power systems are limited by the complex relationships of the power marketing program to the diverse objectives of the Federal water resources management programs. Power will continue to be generated and transmitted from Federal dams in accordance with legislated multipurpose project objectives which, along with power generation include flood control, irrigation, international and Indian treaty commitments, recreation, safety and environmental objectives.

Although funds are included in the budget for operating the Power Marketing Administrations (PMA) in 1987, the Administration will actively seek to privatize these utility systems. Utilities are not normally a Federal responsibility, and non-Federal owners can operate the PMA's as efficiently, or more efficiently, than the Federal Government.

The Administration will pursue privatization through an open process. It will be guided by the following principles: (1) seek a fair return to the Federal taxpayers from the privatization of these assets, (2) recognize the benefits currently enjoyed by existing customers, and (3) recognize and provide appropriate protections for the personnel benefits of Federal employees.

Before implementation of privatization, the Administration will seek the views of, and promote interest among, concerned groups and individuals, including Congressional delegations, State and local official, current customers, the financial community, and public power and private sector energy interests.

It is expected that the PMA's will be sold, with all the PMA's being transferred from Federal control by FY 1991. In the interim, the FY 1987 budget proposes to modify PMA capital investment repayment practices legislatively, consistent with sound business principles, to protect the interests of the Nation's taxpayers. These modifications require repayment of the unpaid balance of the original deferral investment at a level not less than would be required under a fixed, straight-line amortization schedule for each power investment financed by appropriations and placed in service. This requirement would not apply to irrigation investments. Repayments of principal, if necessary, can be deferred, subject to the same terms and conditions applicable to deferred interest payments (e.g., current interest rates are used because the deferral helps finance current operation). The impact of this repayment proposal is relatively modest compared to the proposal made last year in the FY 1986 budget.

Program Goal, Long-Range Objectives, and Accomplishments

Western's program goal is to implement national energy policy by providing reliable electrical service while optimizing energy conservation and the use and development of renewable resources. Specifically, Western:

Assures that economical, reliable, and efficient hydropower is available from Federal powerplants to over 550 customers in a geographic area encompassing 1.3 million square miles in 15 Central and Western States. (Although Western sells power wholesale, it is estimated that the approximately 50 billion kilowatthours (kWh) marketed in FY 1985 would serve 7,952,000 residences, or 21,867,000 people for 1 year);

Markets power, as required by existing law, at the lowest possible rates consistent with sound business principles to recover the costs of operation and the cost of capital, with interest invested in power facilities, as well as capital invested in certain nonpower facilities;

Repays reimbursable capital investment within a reasonable period, usually 50 years;

Gives preference in the sale of power to public bodies and cooperatives; and

Constructs, operates, and maintains power transmission facilities to achieve a high degree of power system reliability.

Western's primary long-range objective is to maintain a workable and progressive power marketing program that will continue to provide efficient and reliable electrical power to customers. Major activities include the development of power marketing plans and the development and adjustment of power rates. Western must further maintain an adequate and reliable transmission system in order to deliver Federal power to customer delivery points, transfer energy from renewable resources, and displace nonrenewable resources, such as energy from oil-fired powerplants of non-Federal utilities, with Federal hydropower. This entails an active program of conducting transmission system planning and operational studies and a responsive planning, design, and construction program for those facilities identified as necessary for mission accomplishment. An additional long-range objective is the development and implementation of an active conservation and renewable energy program both for in-house application and implementation by Western's power customers in conjunction with the power marketing program.

Western's high-voltage transmission system, which overlays a vast network of lower voltage lines, is used to move large quantities of electric energy and is part of a larger interconnected network covering the Central and Western United States. Network reliability is the measure by which Western's operation can be evaluated. Network reliability can be defined as the ability to withstand severe emergency conditions without uncontrolled cascading tripouts of system components which in turn lead to widespread power outages or blackouts. Minimum reliability criteria for system planning and operations, as established by the North American Electric Reliability Council regions in which Western operates (the Mid-Continent Area Power Pool and the Western Systems Coordinating Council), are used as standards in assessing Western's system operation.

For the period FY 1987 to FY 1991, Western's agencywide objectives by activity are:

Construction and Rehabilitation - Plan, design, and construct facilities to assure that Western's power transmission system will be adequate and reliable to deliver power to customer delivery points, to transfer energy from renewable resources, and to displace fossil-fired generation when possible.

During the next several years, Western will continue to upgrade and rehabilitate existing transmission facilities to reduce the risk of outages, lower maintenance costs, and increase efficiency of operations.

Work will continue on 345-kV transmission facilities in western Colorado and New Mexico under a joint effort between Western, Colorado-Ute Electric Association, and Public Service Company of Colorado. Construction is scheduled for completion in FY 1988. In addition, work will continue on the 345-kV Hayden-Gore Pass-Blue River transmission facilities, a joint effort between Western, Tri-State Generation and Transmission Association, Inc., Colorado-Ute Electric Association and Platte River Power Authority. Joint studies with other entities will continue to identify facility construction required to support interconnected transmission systems. Work will also be continued on transmission system improvements in Wyoming, Montana, North Dakota, South Dakota, Arizona, and Colorado. Western will complete construction of the 200-megawatt (MW) DC tie at Sidney, Nebraska, in FY 1987.

Engineering studies, environmental activities, field investigations, and land and rights activities will continue for construction of additional transmission facilities (interties) to allow for mutually beneficial power sales between the Pacific Northwest, California, Nevada, and Arizona.

Western is also conducting engineering and power marketing studies connected with the development and operation of Navy Geothermal projects at Fallon, Nevada, and transmission service from Tracy Substation to Lawrence Livermore Laboratories in California.

Power Management and Operation and Maintenance - There are three primary objectives:

1. Conduct an operation, maintenance, and replacement program in order to provide reliable service to Western's customers in a cost-effective manner.

   Regular power system operation and maintenance activities funded by appropriations and power revenues, including preventive maintenance and replacement of obsolete equipment or equipment that has reached its useful life, will continue throughout Western's service area.

   Western's Continuing Fund will ensure delivery of power to customers by providing a ready source of funding to defray expenses because of unusual or emergency conditions.

2. Plan and manage energy supplies.

   Western is required by law to maintain rates which are adequate to meet the repayment requirements of each project. Repayment is accomplished in accordance with various laws as well as the following policies, procedures, and guidelines:

   Secretary, Department of Energy, Delegation Order 0204-108, effective December 14, 1983, which addresses the development and approval of Power Marketing Administration power and transmission rates.

   Department of Energy Order No. RA 6120.2, dated September 27, 1979, as revised September 30, 1983, on Power Marketing Administration financial reporting.

Procedures for public participation in power and transmission rate adjustments and extensions for the Alaska, Southeastern, Southwestern, and Western Area Power Administrations (10 CFR 903).

Filing requirements and procedures for approving the rates of Federal Power Marketing Administrations, Federal Energy Regulatory Commission (FERC) Docket No. RM 80-40-000, issued June 12, 1984 (18 CFR 300).

In FY 1985, FERC confirmed and approved, on a final basis, rate adjustments for the Central Valley Project (third party transmission); the Pick-Sloan Missouri Basin Program (P-SMBP); and the Rio Grande Project.

Power rate studies will be performed during FY 1986 and FY 1987 for the Boulder Canyon Project, Central Valley Project, Collbran Project, Colorado River Storage Project (CRSP), Fryingpan-Arkansas Project, Pacific Northwest-Pacific Southwest AC Intertie, Parker-Davis Project, P-SMBP, Rio Grande Project, Washoe Project, and for wheeling rates for the Central Valley Project and the CRSP.

The Federal Power Marketing Administrations (PMAs) are required by law to repay the original Federal investment in hydroelectric generation and transmission projects, with interest, as well as that portion of irrigation investments assigned to be repaid from power sales. As of September 30, 1985, the investment to be repaid by Western's power system totaled about \$4.1 billion of which \$1.8 billion has been repaid. Cumulative power revenues total \$6.3 billion. This sum has provided \$2.2 billion for operation and maintenance and facility charges, \$1.0 billion for purchase power, \$1.3 billion for interest, and \$1.8 billion for repayment of investment in facilities and assistance to irrigation.

Western continues to work on the development of post-1989 marketing plans (criteria), which define the quantity of power and energy for sale, geographic area involved, method of service, and customer qualifications. These plans will be implemented upon the expiration of existing contracts during the time period between 1989 and 2004.

Power marketing plans for Federal power from the P-SMBP (Western Division), the Fryingpan-Arkansas Project, the CRSP, Collbran, Rio Grande, and Provo River projects are presently being developed to be effective beginning with the October 1989 billing period, coincidental with the expiration of existing contracts.

During FY 1985, Western marketed nearly 50 billion kWh of available energy to over 550 power customers with electric service revenues of about \$614 million. In FY 1986, energy sales are estimated at 37.0 billion kWh and revenues are estimated at \$571.9 million. Sales are estimated at 35.4 billion kWh and revenues are estimated at \$589.2 million in FY 1987. Annual sales will average about 34 billion kWh with annual revenues of about \$566 million during the outyears. The above revenue totals include power sales, wheeling for others, and other miscellaneous power revenues and exclude BuRec energy sales and revenues associated with project use.

Water years 1983 and 1984 were two of the wettest in the last 40 years and above average runoff occurred in 1985. The excess energy due to these water conditions has resulted in significant increases in Western's fuel replacement sales during FY 1983 through FY 1985 with commensurate increases in revenues returned to the Treasury.

The change in energy sales from FY 1985 through FY 1987 is primarily a result of a return to average water conditions after FY 1985, plus a decline in the amount of Central Arizona Project (CAP) power that Western is able to market due to increasing project use of the power for pumping water along the CAP aqueduct. Even though energy sales are declining over the period, power revenues will not significantly decline, due primarily to scheduled rate increases for the Central Valley Project in California.

Western is also actively negotiating with the Province of Manitoba, Canada, for a potential long-term (i.e., 35 years) 1,100-MW power purchase arrangement for its customers. If these negotiations are successful, there could be an impact on outyear budget requests for construction of transmission facilities by the Federal Government and for power purchase activities.

3. Plan and implement an effective conservation and renewable energy program.

   This program provides for technology transfers, including providing workshops and seminars for Western's customers, developing community energy management plans and home energy rating systems, and for economic analyses.

   Since 1981, Western has laid the groundwork for its customer-oriented Conservation and Renewable Energy (C&RE) program by developing program alternatives to meet its customers' needs. Western has become a trusted agent with its customers in the joint implementation of its C&RE efforts. The program has gained strong acceptance, credibility, and support. Most of Western's C&RE program activities are geared toward providing a mechanism for Western and its customers to be able to rapidly respond to changing supply and demand situations. The C&RE program works through a series of interpersonal contacts between Western staff and customer directors, managers, superintendents, engineers, and utility representatives. Western's program continues to be aimed at gathering and disseminating energy demand and supply data, economic information, development technology, and at providing training and education.

   The passage of P.L. 98-381, August 17, 1984, resulted in a public process through which Western amended its existing regulations for the development and implementation of an energy conservation program by Western's customers.

Purchase Power and Wheeling - Purchase of energy to meet contractual obligations and participate in the fuel replacement program (formerly the oil conservation program).

The former oil conservation program is now referred to as the fuel replacement program. The change reflects the actual use of the Federal hydropower system in promoting more efficient utilization of non-renewable resources. The amounts and types of thermal generation resources installed within Western's marketing area have changed over time. Current energy resource conditions allow Western to displace a mix of oil-, natural gas-, and coal-fired generation. Consequently, the classification as a fuel replacement program was deemed more appropriate.

Western will continue to purchase power and pay wheeling charges to meet firm contractual obligations and participate in the fuel replacement program during the period FY 1987 - FY 1991. Appropriations are primarily earmarked for purchases of energy for the Central Valley Project (CVP) in California. Budget requests for the CVP will continue to be based on a blend of federally generated energy, energy previously banked with the Pacific Gas and Electric Company, and energy support purchases from various entities to meet existing firm contract commitments.

Staffing

To accomplish these objectives, Western is allocated a total employment level of 1,379 full-time equivalents as a base-level staffing requirement in FY 1987. Western continues to contract out services, where feasible, in accordance with OMB Circular A-76 principles.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
WESTERN AREA POWER ADMINISTRATION
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
POWER MARKETING - WESTERN AREA POWER ADMINISTRATION
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Power Marketing - Western Area Power Administration					
Construction and rehabilitation					
Operating expenses	$ 83,230	$ 79,165	$ 79,165	$ 83,985	$ 4,820
System operation and maintenance					
Operating expenses [1]	75,000	74,477	74,683	86,172	11,489
Purchase power and wheeling					
Operating expenses	90,000	72,500	72,500	113,690	41,190
Subtotal (Program)	$248,230	$226,142	$226,348	$283,847	$57,499
Use of prior year balances (net)	-30,000	-30,300	-43,538	-43,538	-0-
Total					
Operating expenses.......	$218,230	$195,842	$182,810	$240,309	$57,499
Power Marketing - Western Area Power Administration	$218,230	$195,842	$182,810	$240,309	$57,499
Staffing Total FTEs	1,181	1,160	1,160	1,160	-0-

Principal Acts governing program:

Authorization: Reclamation Act of 1902
Reclamation Project Act of 1939, Public Law 76-260
Flood Control Act of 1944, Section 5
Public Law 95-91, 1977, Section 302
Hoover Power Plant Act of 1984

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[1] Includes the following amounts of permanent budget authority that will be transferred to Western for operation and maintenance and power marketing activities of the Boulder Canyon Project as provided in section 104(a)(4) of the Hoover Power Plant Act of 1984 (Public Law 98-381, 98 Stat. 1333):

Fiscal Year	Amount
1986	$ 890,000
1987	$3,463,000

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
WESTERN AREA POWER ADMINISTRATION
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
POWER MARKETING - WESTERN AREA POWER ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

FY 1986 Program	$226,142
Built-in increases and decreases:	
Increase for Standard Level User Charge (rent) costs	+ 206
FY 1987 Base (Program)	$226,348
Program increases and decreases:	
Program increases in construction and rehabilitation activities due to a higher level of construction activity	+4,820
Increase in operation and maintenance activities for replacements, additions, materials, and supplies to improve operational efficiency, plus adjustments for allocation of Administrative and General Expenses	+11,489
Increase in purchase power and wheeling program due to increased cost of power and first full year of buying more firm thermal power and less surplus hydropower	+41,190
FY 1987 Program	$283,847
Application of Prior year balances	-43,538
FY 1987 budget request	$240,309

NARRATIVE JUSTIFICATION

The FY 1987 request of $240,309,000 reflects an increase of $44,467,000 over the FY 1986 appropriation of $195,842,000. Of the total increase approximately $30 million is due to increased purchase power and wheeling requirements for the Central Valley Project (CVP) in California. In FY 1986, Western is implementing a contract with Basin Electric Power Cooperative for the delivery of power to the CVP. The FY 1987 request reflects the first full year of the purchase of this higher cost power. In addition, the amount of power purchased from Bonneville Power Administration (BPA) through the use of nonappropriation transfers will be reduced, which will further increase purchase power appropriation requirements in FY 1987. The remainder of the increase, $14.4 million, is primarily due to increased power system replacements and additions, including consolidation of transmission facilities at Hoover Powerplant in southern Nevada, and adjustments in allocation of Western's administrative and general expenses.

Narrative justifications for each of Western's activities are provided below.

Construction and Rehabilitation - General Statement

Summarized Financial Data:

Fiscal Year 1986	
Appropriation	$ 76,233,000
Application of Prior Year Balances	3,000,000
FY 1986 FTE General Reduction	-68,000
Subtotal	$ 79,165,000
Adjustment for Actual Unobligated Balances	4,678,999
Subtotal (direct program)	$ 83,843,999
Non-Federal Advances for Cosponsored Work	31,791,698
Total FY 1986	$115,635,697
Fiscal Year 1987	
Estimate of Appropriation	$ 77,685,000
Application of Prior Year Balances	6,300,000
Subtotal	83,985,000
Non-Federal Advances for Cosponsored Work	22,718,000
Total FY 1987	$106,703,000

Western's construction program is required to continue to satisfy obligations for the delivery of power. These requirements change as the interconnected power systems, of which Western is a part, grow and evolve. As a result of interconnections, transmission line loading is no longer solely a function of Western's resources and loads but is influenced by the load and resource arrangements of the systems with which it interconnects. Furthermore, disturbances in one system reflect throughout the interconnected systems. Thus, to assure reliable operation of its transmission system, Western must rehabilitate, upgrade, or replace transmission facilities which have reached the end of their useful service, have become overloaded, or have sustained damage. To the maximum extent possible, the cost of system upgrading is shared with neighboring utilities who also benefit from the resulting interconnected system transmission capacity. Interconnection and increased transmission capacity allow for the exchange of power and energy between utilities. This exchange facilitates greater utilization of lower cost sources of energy and a minimum duplication of facilities. This potentially allows for the purchase of lower cost energy from more distant sources to meet the requirements for firm power, which is guaranteed to be available at all times except for reasons of certain uncontrollable forces or continuity of service provisions.

Western's construction activity is made up of two basic components: (1) items related to the rehabilitation and upgrade of existing facilities; and (2) new facilities. More than 50 percent of Western's 16,000 miles of transmission lines were constructed with wood poles. These poles have an average life of 25 to 30 years which can be extended to 45 to 50 years by chemical retreatment. A large number of the wood poles which Western inherited, however, were not retreated and have reached, or are approaching, their useful service lives. As a result of the aged wood poles and the need to increase transfer capability, Western must continue an improvement program to upgrade and rehabilitate these lines to keep the system not only fully operational, but also operating in accordance with reliability standards established by the Western Systems Coordinating Council and the Mid-Continent Area Power Pool. In FY 1987, Western will complete work on four transmission lines and is requesting funds for the award of construction contracts on four other transmission lines. By maintaining an orderly, balanced schedule of contract awards, Western will be able to carry out its responsibility to provide for the continuous and reliable delivery of power at the lowest possible cost to the customer.

Whether rehabilitating and upgrading existing facilities or constructing new facilities, Western's construction activities often involve joint projects with other utilities. By participating with other utilities on joint projects, Western is able to take advantage of existing facility sites and transmission line rights-of-way, achieve economy of scale by developing one large project in lieu of two or more smaller projects, and enhance revenues from the Federal power system. Costs for such joint projects are apportioned among the various participants according to their respective needs and the benefits derived from their use of the facilities. The size of Western's share of joint projects is based on studies to determine the capacity needed to meet Western's legislative and contractual commitments.

Western rehabilitates and upgrades existing facilities to:

- Replace worn out equipment and facilities which are beyond their useful lives, thereby reducing outages and lowering maintenance costs.

- Replace overloaded equipment and facilities with higher capacity components to avoid outages.

- Replace aging and damaged wood-pole transmission structures with either new wood poles or steel structures.

- Upgrade portions of Western's transmission system facilities to increase reliability of operations; meet current safety, environmental, and conservation standards; maintain or increase the efficiency of operation and maintenance work; and serve increased customer loads.

Western builds new transmission facilities to:

- Improve the transmission system's stability and reliability to avoid major outages.
- Interconnect with other power systems to take advantage of differing load patterns between regions in order to minimize construction of new generating capacity.
- Provide increased joint transmission capacity to transfer lower cost nuclear and coal-fired generation to offset higher cost oil- and gas-fired generation and to earn wheeling revenues to assist in repayment of new facilities.
- Increase power transfer capability between Western's eastern and western transmission systems to improve system operations and efficiency and allow transfer of hydroelectric and coal-fired generation to reduce use of higher cost oil-fired generation.
- Provide increased transmission capacity to reduce the overburdening of Western's and other utilities' interconnected transmission facilities.
- Increase Western's fuel replacement program. This program consists primarily of purchasing coal-fired energy to meet Western's loads during offpeak periods. Water saved in this manner is released through hydroelectric plants onpeak to replace high-cost oil- or gas-fired energy which would have been needed by neighboring utilities. Cost savings are shared between Western and the other utilities involved.

In many instances, the need for new transmission facilities is determined through Western's participation in joint planning with other interconnected utilities. The proportionate responsibility for new facilities is based on each utility's share of generation resources and loads served. Any new transmission capacity in excess of Western's current needs is used to wheel firm or nonfirm energy for others, thereby providing revenues to assist in repayment of costs.

Accomplishments

- Construction of the Miles City AC-DC-AC Converter Station and related facilities was completed and commercial operation began in July 1985.
- Western awarded a construction contract on June 10, 1985, for the Spence-Thermopolis 230-kV Transmission Line in Wyoming.
- Negotiations were completed on a Memorandum of Understanding among the major utilities in California regarding the participation, ownership, construction, and operation of the California-Oregon Transmission Project in California, as well as compensation to Western for the existing Federal facilities.
- A construction contract was awarded in FY 1985 to reroute the Devils Lake Area Transmission Line in North Dakota.

- Western awarded a construction contract on September 26, 1985 for the Liberty-Coolidge 230-kV Transmission Line in Arizona.

- Construction was completed on 16 substation additions, 23 miles of transmission lines, and 1 communication system addition in FY 1985.

Objectives

- Continue to plan, design, and construct essential transmission lines, substations, and other facilities, sharing these efforts with neighboring utilities to the maximum extent possible. Western plans to complete construction on 18 substation additions, 3 building additions, 5 communication system additions, and over 370 miles of transmission lines in FY 1986, and 10 substation additions, approximately 400 miles of transmission lines, 3 building additions and 1 communication system addition in FY 1987.

- Construction of the Great Falls-Conrad 230-kV Transmission Line and Terminal Facilities is expected to be completed in FY 1986.

- Award contracts for the acquisition of Computer Aided Engineering equipment during FY 1986 and additional equipment in FY 1987.

- Award a construction contract for the Blue River-Gore Pass portion of the Hayden-Gore Pass-Blue River 345-kV Transmission Line during FY 1986.

- Award a construction contract for the Casper-Spence portion of the Casper-Spence-Thermopolis 230-kV Transmission Line during FY 1986.

- Western will award contracts in FY 1986 for the purchase and installation of equipment at Maurine Substation in northwestern South Dakota.

- A construction contract will be awarded in FY 1986 for the Archer (Wyoming)-Stegall (Nebraska) 115-kV Transmission Line replacement.

- Work will continue on the replacement and rehabilitation of deteriorated wood-pole transmission structures.

FY 1987 Budget Request

Western's construction activity is executed in stages. Accordingly, annual funding required for a given facility or activity will vary depending on which stage is scheduled for accomplishment during that particular year.

Western's FY 1987 requirement of $83,985,000 includes $12,415,000 for performing engineering studies, field surveys, environmental work, design and specification preparation, and land and rights activities. These tasks are an integral part of Western's construction activity and represent the continuing effort to rehabilitate and upgrade Western's power transmission system to insure continuous and reliable service.

In FY 1987, the request provides funds for continuing participation in the Mead-Phoenix DC Intertie project with the Southern California Public Power Authority. The project will provide additional transmission capacity in the states of Arizona, Nevada, and California. The financing of this project is currently planned as almost totally non-Federal. The request also provides for preliminary engineering and power marketing activities to be performed on the Mead-Adelanto DC Intertie in Nevada and California, the Mead-Northwest DC Intertie. Western will also continue to participate with others on the California-Oregon Transmission Project in California to connect the Pacific Northwest and Pacific Southwest regions as authorized by Public Laws 88-552 and 98-360. Funds may be used to increase Western's percentage of transfer capability in the California-Oregon Transmission Project. Funds are also provided for preconstruction activities on the Fallon-Ft. Churchill Transmission Line which is associated with the development, by the United States Navy, of the Geothermal projects at Fallon, Nevada; for transmission improvements and modifications in western Kansas under joint participation arrangements with others; for the Craig-Bonanza 345-kV Transmission Line in Colorado and Utah; and for various system upgrades.

The FY 1987 request also includes $30,482,000 for continuing or completing work on facilities which were under construction in FY 1986. Included in the request are funds for the completion of: the Liberty-Coolidge 230-kV Transmission Line and associated terminal facilities in Arizona to increase system reliability and provide the transfer capability required to serve the Central Arizona Project loads; Maurine Substation additions to provide improved system reliability and capability in northwestern South Dakota; the Devils Lake Area Transmission in North Dakota to prevent the possibility of line outages due to structure collapse; the Sidney DC tie additions and related AC facilities to interconnect Western's eastern and western transmission system; the Archer-Stegall 115-kV Transmission Line replacement to provide increased reliability and additional capacity in southeastern Wyoming and western Nebraska; the Blue River-Gore Pass portion of the Hayden-Gore Pass-Blue River 345-kV Transmission Line to provide increased transmission capability between eastern and western Colorado; the Billings Area Microwave System to provide a more reliable communication and control system; the Saguaro-Tucson 115-kV Transmission Line rebuild in Arizona to provide increased capacity; the Huron District Office service center additions to provide a facility for testing construction materials and a vehicle maintenance shop; and equipment additions at various substations and switchyards such as Granite Falls Substation (Minnesota), Casper Substation (Wyoming), and Lone Butte Substation (Arizona).

Work will be continued on the 345-kV transmission line and terminal facility additions, including phase-shifting transformers, in western Colorado and northern New Mexico. This project, which is being financed jointly by Western, Colorado-Ute Electric Association, and Public Service Company of Colorado, will reduce major system outages, reduce energy losses, reduce inadvertant flows, and will increase the reliability of the interconnected transmission systems. The purchase and installation of additional capacitor banks, a 300-MVA, 230-kV phase-shifting transformer, and a 600 MVA 345/230-kV

Department of Energy

FY 1987 Congresional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Conference	General Reduction	Pay Cost* Restoration	FTE General Reduction	Gramm Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
Western Area Power Administration								
Operations & Maintenance								
Operating expenses	$ 80,300	$ ---	$ ---	$ -68	$-1,067	$ 79,165	$ -3,000	$ 76,165
System operation and maintenance Operating expenses	75,000	---	1,000	---	-523	75,477	-1,500	73,977
Purchase power and wheeling Operating expenses	82,500	-10,000	---	---	---	72,500	-25,800	46,700
Subtotal, Western Area Power Administration	$237,800	$-10,000	$ 1,000	$ -68	$-1,590	$227,142	-30,300	$196,842
General Reduction	-10,000	+10,000	---	---	---	---	---	---
FTE Reduction	-68	---	---	+68	---	---	---	---
Pay Restoration (ESR&D Transfer)......	-1,000	---	---	---	---	-1,000	---	-1,000
Use of Prior Year Balances (WAPA)	-30,300	---	---	---	---	-30,300	30,300	---
Total, Western Area Power Administration	$196,432	$ ---	$ 1,000	$ ---	$-1,590	$195,842	$ ---	$195,842

*Less: Transfer of unobligated balances.

transformer for the Glen Canyon-Flagstaff-Pinnacle Peak transmission system in Arizona will be continued. These additions will provide additional transfer capability, reduce inadvertant flows, and allow utilization of the extra generation from the uprated powerplant at Glen Canyon Dam.

Work will also be continued on the Casper-Spence-Thermopolis 230-kV Transmission Line and terminal facilities (formerly called the Thermopolis-Alcova-Casper 230-kV Transmission Line) which will allow capacity exchanges between Western and Pacific Power and Light Company, provide increased transfer capability through Wyoming, and relieve overloading conditions. Western will continue to participate with Tri-State Generation and Transmission Association, Colorado-Ute Electric Association, and Platte River Power Authority on the Hayden-Gore Pass portion of the Hayden-Gore Pass-Blue River 345-kV Transmission Line which is needed to meet increasing power requirements in the Winter Park, Colorado, area, to improve system stability and reliability, and to increase transmission capability between eastern and western Colorado.

Other ongoing work includes the purchase and installation of microwave equipment, Computer Aided Engineering equipment, and various system modifications or additions to previously completed facilities to improve reliability and operational efficiency.

The FY 1987 request includes $41,088,000 for construction contract awards associated with the upgrading of Western's power transmission system. Of this amount, $8,550,000 is for construction of the Conrad-Shelby 230-kV Transmission Line and terminal facilities to improve system reliability in the Cut Bank/Shelby area of Montana by providing additional transmission capacity and reducing transmission system power and energy losses. In addition, construction of this line will insure that the electrical loads in the area will continue to be served reliably during scheduled and unscheduled outages.

The $41,088,000 request for contract awards also includes $6,775,000 for the construction of the Liberty-Parker 230-kV Transmission Line and terminal facilities in Arizona. Western plans to upgrade the existing 161-kV line to 230 kV to increase transmission capacity from the Colorado River to Phoenix, Arizona, and improve system reliability and stability in the area. The construction contract will be incrementally funded in FY 1987 with approximately half of the funds planned for obligation at award and the remainder planned for obligation in FY 1988.

The request for new contract awards also provides $7,230,000 for construction of the Casper-Dave Johnston 230-kV Transmission Line and terminal facilities in Wyoming. These facilities will improve system reliability in the central Wyoming area by increasing the transfer capability between Colorado and Montana, and reducing system losses due to the currently limited transmission capacity and the deteriorated condition of the existing lines. In addition, construction of this line will provide a source, as a pathway from Dave Johnston powerplant, for the 230-kV operation of the Casper-Spence-Thermopolis 230-kV Transmission Line now under construction.

In addition, the $41,088,000 request for contract awards includes $5,555,000 to rebuild and upgrade, to 115 kV, the Casper-Waltman 69-kV Transmission Line and terminal facilities in Wyoming. This rebuild will provide increased system reliability by replacing the deteriorated line with new structures and by reducing the susceptibility of the line to lightning strikes through installation of overhead ground wires.

The remaining balance of $12,978,000 for contract awards will be used to initiate work on various system improvements including: Bismarck Substation additions (North Dakota); Sioux City Substation additions (Iowa); Morris Substation additions (Minnesota); Dawson County Substation additions (Montana); Flandreau Substation additions (South Dakota), Wolf Point Substation additions (Montana); Cheyenne Substation modifications (Wyoming); Curecanti-Montrose 115-kV Transmission Line Upgrade (Colorado); paving of the warehouse yard at the Power Marketing Operations Complex in Loveland, Colorado; and shop buildings and warehouse additions to the Casper (Wyoming) and Gering (Nebraska) service centers. These facility additions are required to maintain and improve the reliability and operational efficiency of Western's power transmission system.

The following tabulations and power system data sheets explain Western's construction program in more detail.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
CONSTRUCTION SUMMARY
(In thousands of dollars)

Power System/Activity	Estimated Total 1/	Estimated Obligations to Date	FY 1986 Estimate	FY 1987 Request 2/	Remaining Balance
Central Valley Project					
Transmission Lines and Terminal Facilities	$ 88,986	$ 14,442	$ 30	$ 441	$ 74,073
Substations	16,303	14,612	1,691	-0-	-0-
Other	30,391	24,002	611	224	5,554
Subtotal	$ 135,680	$ 53,056	$ 2,332	$ 665	$ 79,627
Parker-Davis Project					
Liberty-Coolidge 230-kV T.L.	$ 23,257	$ 20,814	$ 1,102	$ 1,341	$ -0-
Liberty-Parker 230-kV T.L.	14,700	-0-	1,500	6,775 3/	6,425 3/
Transmission Lines and Terminal Facilities	35,047	8,999	1,775	976	23,297
Substations	6,135	4,288	1,828	19	-0-
Other	7,483	4,308	978	512	1,685
Subtotal	$ 86,622	$ 38,409	$ 7,183	$ 9,623	$ 31,407
Pacific Northwest-Pacific Southwest Intertie					
Transmission Lines and Terminal Facilities	$ 245,544	$ 9,010	$ 8,313	$ 4,842	$ 223,379
Other	886	46	90	750	-0-
Subtotal	$ 246,430	$ 9,056	$ 8,403	$ 5,592	$ 223,379
Pick-Sloan Missouri Basin Program					
Archer-Stegall 115-kV T.L.	$ 10,549	$ 780	$ 9,149	$ 620	$ -0-
Casper-Spence-Thermopolis 230-kV T.L.	31,348	21,480	7,628	873	1,367
Billings Microwave System	11,887	6,842	3,209	1,836	-0-
Conrad-Shelby 230-kV T.L.	10,675	300	255	8,550	1,570
Casper-Dave Johnston 230-kV T.L.	8,979	109	380	7,230	1,260
AC-DC-AC Ties	57,595	53,943	2,942 4/	710 4/	-0-
Casper-Waltman 115-kV T.L.	6,954	104	330	5,555	965
Blue River-Gore Pass 230/345-kV T.L.	6,439	1,737	4,101	601	-0-
Transmission Lines and Terminal Facilities	272,432	24,502	4,189	4,929	238,812
Substations	72,462	14,422	12,813	11,237	33,990
Other	122,010	106,254	7,910	3,828	4,018
Subtotal	$ 611,330	$ 230,473	$ 52,906	$ 45,969	$ 281,982
Colorado River Storage Project					
Western Colorado 345-kV T.L.	$ 72,645	$ 58,330	$ 4,985 5/	$ 6,360	$ 2,970
Glen Canyon-Flagstaff-Pinnacle Peak	21,680	2,099	1,337	7,739	10,505
Transmission Lines and Terminal Facilities	169,581	24,880	2,608	5,448	136,645
Substations	7,968	4,796	1,642	1,052	478
Other	23,275	17,061	2,412	985	2,817
Subtotal	$ 295,149	$ 107,166	$ 12,984	$ 21,584	$ 153,415
Other Power System Activities					
Transmission Lines and Terminal Facilities	$ 9,908	$ 208	$ 36	$ 552 6/	$ 9,112
Subtotal	$ 9,908	$ 208	$ 36	$ 552	$ 9,112
Total, Western	$1,385,119	$ 438,368	$ 83,844	$ 83,985 7/	$ 778,922

1/ Federal funds only.

2/ Construction contracts for facilities with a total estimated cost in excess of $10 million are planned for incremental funding.

3/ Reflects planned incremental funding for the construction contract.

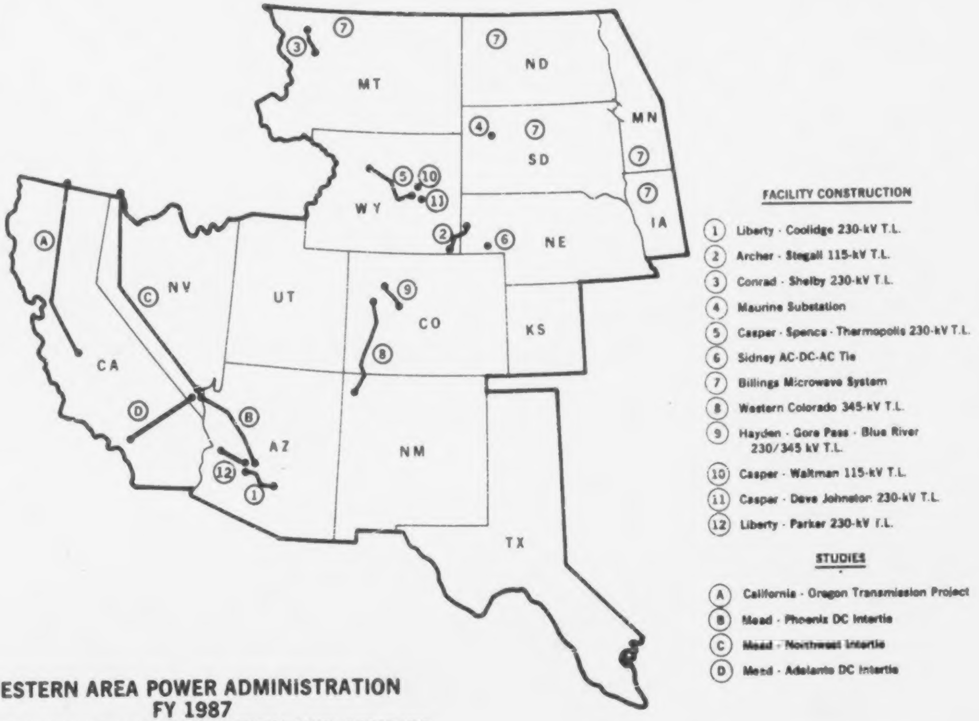
4/ Includes unobligated balance from the FY 1983 $30 million supplemental appropriation carried forward to fund the Sidney DC Tie additions (FY 1986: $2,225,000; FY 1987: $710,000).

5/ Provides for follow-on work necessary to alleviate inadvertant power flow in western Colorado and northern New Mexico.

6/ Preconstruction activities for Fallon, Nevada Geothermal projects construction program.

7/ Reflects $77,685,000 of new budget authority; $710,000 of prior year balances for Sidney DC Tie additions; and $5,590,000 of prior year balances for Liberty-Parker 230-kV T.L.

Note: Activity line item selection criteria basis: major construction item with $5,000,000 or greater total cost with construction in FY 1987.


MT
ND
MN
SD
WY
NE
IA
NV
UT
CO
KS
CA
AZ
NM
TX
FACILITY CONSTRUCTION
① Liberty - Coolidge 230-kV T.L.
② Archer - Stegall 115-kV T.L.
③ Conrad - Shelby 230-kV T.L.
④ Maurine Substation
⑤ Casper - Spence - Thermopolis 230-kV T.L.
⑥ Sidney AC-DC-AC Tie
⑦ Billings Microwave System
⑧ Western Colorado 345-kV T.L.
⑨ Hayden - Gore Pass - Blue River 230/345 kV T.L.
⑩ Casper - Waltman 115-kV T.L.
⑪ Casper - Dave Johnston 230-kV T.L.
⑫ Liberty - Parker 230-kV T.L.
STUDIES
Ⓐ California - Oregon Transmission Project
Ⓑ Mead - Phoenix DC Intertie
Ⓒ Mead - Northwest Intertie
Ⓓ Mead - Adelanto DC Intertie

WESTERN AREA POWER ADMINISTRATION
FY 1987
MAJOR FACILITY CONSTRUCTION AND STUDIES

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET
WESTERN AREA POWER ADMINISTRATION
(Dollars in thousands)

Central Valley Power System

	Estimated Total	Cumulative Prior Years	FY 1986 Estimate		FY 1987 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE): Design and Construction	$135,680	$ 53,056	$ 2,332	$ 6,723	$ 665	$ 750	$ 79,627
Total DOE obs/BO	$135,680	$ 53,056	$ 2,332	$ 6,723	$ 665	$ 750	$ 79,627
Non-DOE obs/BO Design and Construction	$ 8,252	$ 279	$ 3,673	$ 3,164	$ 4,300	$ 4,206	$ ---
Total Obligations/Outlays	$143,932	$ 53,335	$ 6,005	$ 9,887	$ 4,965	$ 4,956	$ 79,627
Method of Financing:							
Appropriations Available and Required			$ 2,313		$ 665		$ 79,627
Application of Prior Year Funds			$ 19		$ ---		$ ---
Non-Federal Advances			$ 3,673		$ 4,300		$ ---

Central Valley Power System (continued)

Description, Objective, and Justification

The Central Valley Transmission System consists of over 1,300 circuit miles of 69- to 500-kV transmission lines which interconnect 10 powerplants, 1 pumping plant, and 12 major substations. Western markets electric power to preference wholesale customers and others, and administers a sales, transmission, and interchange contract with the Pacific Gas and Electric Company (PG&E), the major private power utility in the area.

The objective of the program is to provide Western's customers with reliable electric power by increasing transmission system dependability and decreasing system line losses.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Transmission Lines and Terminal Facilities	Continuing		$441,000

- Preconstruction activities will be performed for the second phase of upgrading and modernizing the Cottonwood-Elverta No. 3 230-kV Transmission Line and for transmission facilities for the City of Roseville in California. All costs associated with the construction of the Roseville Direct Service transmission facilities will be financed entirely by the City of Roseville.

POWER SYSTEM DATA SHEET - 3
WESTERN AREA POWER ADMINISTRATION

Central Valley Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Other	Continuing		224,000
- Western will continue the purchase and installation of minor system additions and will continue construction and preconstruction activities on minor modifications to substantially completed facilities.			
	Total		$665,000

B. Management and Contracting

- Design and other preconstruction work will be performed by Western staff and outside contractors as required. Construction will be performed by contractor effort.

C. Prior Year Achievements

- Completed construction of Keswick Substation Stage 03 (California). Awarded contracts for Folsom Substation Modifications and Whiskeytown Substation Modifications.

D. Current Year Planned Achievement

- Complete construction of the Sacramento Area Microwave System additions (California), Folsom Substation modifications (California), Whiskeytown Substation (California), Pacheco Substation (California), and Coyote Substation (California).

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET
WESTERN AREA POWER ADMINISTRATION
(Dollars in thousands)

Parker-Davis Power System

	Estimated Total	Cumulative Prior Years	FY 1986 Estimate		FY 1987 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE): Design and Construction	$ 86,622	$ 38,409	$ 7,183	$ 14,936	$ 9,623	$ 12,373	$ 31,407
Total DOE obs/BO	$ 86,622	$ 38,409	$ 7,183	$ 14,936	$ 9,623	$ 12,373	$ 31,407
Non-DOE obs Design and Construction	$ 7,252	$ 1,169	$ 1,083	$ 1,096	$ 1,000	$ 1,012	$ 4,000
Total Obligations/Outlays	$ 93,874	$ 39,578	$ 8,266	$ 16,032	$ 10,623	$ 13,385	$ 35,407
Method of Financing:							
Appropriations Available and Required			$ 7,182		$ 4,033		$ 31,407
Application of Prior Year Funds			$ 1		$ 5,590		$ ---
Non-Federal Advances			$ 1,083		$ 1,000		$ 4,000

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 2
WESTERN AREA POWER ADMINISTRATION

Parker-Davis Power System (continued)

Description, Objectives, and Justification

The Parker-Davis Power System contains over 1,600 miles of transmission lines and over 2,000,000 kVA of installed capacity at substations in Arizona, California, and Nevada. The facilities are constructed to carry power generated by the Bureau of Reclamation hydroelectric plants at Davis Dam and Parker Dam to various load centers of preference customers.

The construction activities funded by this program consist of additions and modifications to the existing transmission system to increase system dependability and to provide reliable electric service to Western's customers.

A. Planned Activities

Activity	Construction		FY 1987
	Start	Stop	Estimate
Liberty-Coolidge 230-kV Transmission Line and Terminal Facilities	1st Qtr 1984	3rd Qtr 1987	$1,341,000

- Construction will be completed on the Liberty-Coolidge 230-kV Transmission Line and associated terminal facilities located in Arizona in FY 1987. The total estimated cost of the Liberty-Coolidge 230-kV Transmission Line and Terminal Facilities is $23,257,000.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 3
WESTERN AREA POWER ADMINISTRATION

Parker-Davis Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Liberty-Parker 230-kV Transmission Line	4th Qtr 1987	1st Qtr 1989	6,775,000

- Construction of the Liberty-Parker 230-kV Transmission Line is scheduled to begin in FY 1987. Western will upgrade approximately 120 miles of the existing wood-pole Parker-Phoenix 161-kV line from Parker Dam in California to Liberty Substation near Phoenix, Arizona. The new line will be constructed utilizing steel structures and larger conductor to allow conversion to 230 kV so that the new line will be compatible with newer 230-kV transmission lines in Arizona.

  Conversion of the existing 161-kV transmission line to 230 kV will provide additional transfer capability between Parker Dam powerplant and Phoenix and reduce line losses, increase system efficiency and reliability, and insure that Western will be able to meet its delivery obligations. In addition, continuing the orderly conversion of the 161-kV system to 230 kV will allow increased economy energy sales.

Parker-Davis Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Liberty-Parker 230-kV Transmission Line (continued)			
The construction contract for this work will be incrementally funded, with an initial obligation being incurred at award in FY 1987 and the remainder of the funds obligated in FY 1988. The total estimated cost for construction of the Liberty-Parker 230-kV Transmission Line and terminal facilities is $14.7 million.			
Transmission Lines and Terminal Facilities	Continuing		976,000
- Construction will be completed on reconductoring the Saguaro-Tucson 115-kV Transmission Line. Western will also perform various planning and design activities on miscellaneous facilities, including the New Mexico-California Transmission Line and the Liberty-Maricopa 230-kV Transmission Line in Arizona.			
Substations	Continuing		19,000
- Western will complete construction of Lone Butte Substation in Arizona, which is financed jointly by Western and the Bureau of Indian Affairs. Lone Butte Substation will be a major facility in the San Carlos Irrigation Project electrical system.			

Parker-Davis Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Other	Continuing		512,000
- Planning, design, and other preconstruction activities will continue on miscellaneous facilities and Western will perform minor modifications to substantially completed facilities.			
	Total		$9,623,000

B. Management and Contracting

- Design and other preconstruction work will be performed by Western staff and outside contractors as required. Construction will be performed by contractor effort.

C. Prior Year Achievements

- Western awarded a construction contract for Liberty-Coolidge 230-kV Transmission Line and Terminal Facilities (Arizona). Construction was completed on Parker Switchyard, Stage 03 (Arizona), Sonora Substation, Stage 01A (Arizona), and Spook Hill Substation, Stage 01 (Arizona).

D. Current Year Planned Achievements

- Western will complete construction of Parker Switchyard, Stage 04 (Arizona), Phoenix Service Center additions for vehicle shelter and parking (Arizona), Liberty Substation (Arizona), Coolidge Substation (Arizona), and ED2-Saguaro No. 2 115-kV Transmission Line (Arizona), and will award a construction contract for Saguaro-Tucson 115-kV Transmission Line Reconductoring (Arizona).

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET
WESTERN AREA POWER ADMINISTRATION
(Dollars in thousands)

Pacific Northwest-Pacific Southwest Intertie

	Estimated Total	Cumulative Prior Years	FY 1986 Estimate		FY 1987 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE):							
Design and Construction	$246,430	$ 9,056	$ 8,403	$ 4,668	$ 5,592	$ 7,127	$223,379
Total DOE obs/BO	$246,430	$ 9,056	$ 8,403	$ 4,668	$ 5,592	$ 7,127	$223,379
Non-DOE obs/BO							
Design and Construction	$316,644	$ 412	$ 15,261	$ 13,034	$ 9,374	$10,254	$291,597
Total Obligations/Outlays	$563,074	$ 9,468	$ 23,664	$ 17,702	$14,966	$17,381	$514,976
Method of Financing:							
Appropriations Available and Required			$ 8,370		$ 5,592		$223,379
Application of Prior Year Funds			$ 33		$ ---		$ ---
Non-Federal Advances			$ 15,261		$ 9,374		$291,597

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 2
WESTERN AREA POWER ADMINISTRATION

Pacific Northwest-Pacific Southwest Intertie (continued)

Description, Objective, and Justification

This power system, authorized by Congress under Public Law 88-552, presently consists of a ±500-kV DC line from the Celilo Converter Station near The Dalles, Oregon, to the Sylmar Converter Station near Los Angeles, California, two 500-kV AC lines from northcentral Oregon through northern California to southern California, and a 345-kV AC line from Mead Substation near Las Vegas, Nevada, to Liberty Substation near Phoenix, Arizona.

Two other high-voltage DC lines, one from the Celilo Converter Station to Mead Substation, the other from Mead Substation to Los Angeles, and a second 345-kV AC line from Mead Substation to the Phoenix area, although authorized, were never constructed.

The Federal portion of the Intertie located in Arizona, California, and Nevada is assigned to Western. The portion located in Oregon is assigned to the Bonneville Power Administration. The existing Intertie facilities permit the sale of power from the Northwest to California, and between Arizona, Nevada, and California and allows seasonal exchanges of capacity between the Pacific Southwest and the Pacific Northwest coastal areas only.

The existing transmission system does not have the capacity needed to meet Western's customers' requests for transmission service under all conditions with present generation and load patterns. Western is working with non-Federal power utility interests to study the costs and benefits of an additional line from Mead Substation to the Phoenix area, approximately 240 miles, which would be financed by non-Federal interests. This is referred to as the Mead-Phoenix DC Intertie, which is Phase I of the continuing project. Study activities are continuing for Phase II, the Mead-Adelanto DC Intertie. The Mead-Adelanto DC Intertie, operating in conjunction with existing and planned interties, could enhance seasonal exchanges between the Pacific Northwest and the noncoastal Southwest. Reevaluation of Phase III, the Mead-Northwest Intertie, is presently being undertaken, taking into consideration the availability of surplus energy from the Federal hydrosystem in the Pacific Northwest, and the possibility of diversity exchange arrangements between entities of the two regions.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 3
WESTERN AREA POWER ADMINISTRATION

Pacific Northwest-Pacific Southwest Intertie (continued)

Public Law 98-360 authorized the Secretary of Energy to construct or participate in the construction of the California-Oregon Transmission Project. This third 500-kV AC line between the Pacific Northwest and California will provide a cost-effective means of increasing intertie reliability. It will also allow greater transfer of low-cost surplus generation from the Northwest to displace more expensive nonrenewable energy in California. Thus, there will be a reduction of power costs to consumers in both regions, and a means provided of enhancing exchanges of surplus firm energy and economy energy among the utilities of the West.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Transmission Lines and Terminal Facilities	Continuing		$4,842,000

- Western, as a joint participant with the Salt River Project and the Southern California Public Power Authority and others, will continue planning studies, preliminary design activity, and land acquisition for the Mead-Phoenix DC Transmission Line (Nevada-Arizona). Western will continue its participation in planning studies and initial land and rights activities on the Mead-Adelanto DC Intertie (Nevada) and the Mead-Northwest Intertie. Western, neighboring utilities, and preference customers will also continue studying the feasibility of constructing a third AC transmission line and upgrading existing 230-kV transmission lines between Oregon and central California (California-Oregon Transmission Project) so that excess power in the Northwest can be marketed in northern and central California.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 4
WESTERN AREA POWER ADMINISTRATION

Pacific Northwest-Pacific Southwest Start Intertie (continued)	Construction Start	Construction Stop	FY 1987 Estimate
Other	Continuing		750,000
- Construction will be completed on a building addition to the Mead O&M Complex in Nevada to provide additional facilities required for engineering activities associated with the Hoover Consolidation, the Mead-Adelanto DC Intertie, the Mead-Phoenix DC Intertie, and the Mead-Northwest Intertie.			
	Total		$5,592,000

B. Management and Contracting

- Planning and land acquisition activities will be performed by Western staff and outside contractors.

C. Prior Year Achievement

- Planning studies continued for the interties between the Pacific Northwest and Pacific Southwest.

D. Current Year Planned Achievements

- Western will continue planning activities in coordination with other participants in the various intertie projects.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET
WESTERN AREA POWER ADMINISTRATION
(Dollars in thousands)

Pick-Sloan Missouri Basin Power System

	Estimated Total	Cumulative Prior Years	FY 1986 Estimate		FY 1987 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE):							
Design and Construction	$611,330	$230,473	$ 52,906	$ 56,344	$ 45,969	$ 37,707	$281,982
Total DOE obs/BO	$611,330	$230,473	$ 52,906	$ 56,344	$ 45,969	$ 37,707	$281,982
Non-DOE obs/BO							
Design and Construction	$ 51,352	$ 24,474	$ 10,755	$ 9,876	$ 3,314	$ 4,430	$ 12,809
Total Obligations/Outlays	$662,682	$254,947	$ 63,661	$ 66,220	$ 49,283	$ 42,137	$294,791
Method of Financing:							
Appropriations Available and Required			$ 46,938		$ 45,259		$281,982
Application of Prior Year Funds			$ 5,971		$ 710		$ ---
Non-Federal Advances			$ 10,755		$ 3,314		$ 12,809

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 2
WESTERN AREA POWER ADMINISTRATION

Pick-Sloan Missouri Basin Power System (continued)

Description, Objective and Justification

The transmission facilities of the Pick-Sloan Missouri Basin Program interconnect Federal hydroelectric powerplants in Western's operational area and deliver power for irrigation pumping and sales to municipalities, cooperatives, private utilities, and State and Federal customers. This major power marketing system is operated by two Western Area Offices: the Loveland Area Office for portions of this program in Wyoming, Colorado, Kansas, and Nebraska; and the Billings Area Office for portions within North Dakota, South Dakota, Iowa, Minnesota, Missouri, Montana, and Nebraska. Western will continue to construct new facilities and upgrade existing transmission facilities to increase system dependability and to assure reliable electric service for Western's customers.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Archer-Stegall 115-kV Transmission Line	3rd Qtr 1986	4th Qtr 1987	$ 620,000
- Western will complete construction on the Archer-Stegall 115-kV Transmission Line in southeastern Wyoming and western Nebraska. The total estimated cost for constructing this line is $10,549,000.			
Casper-Spence (formerly Alcova)-Thermopolis 230-kV Transmission Line and associated facilities	3rd Qtr 1985	1st Qtr 1988	873,000
- Construction will continue on the $31,348,000 Casper-Spence-Thermopolis 230-kV Transmission Line and associated facilities located in Wyoming.			

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 3
WESTERN AREA POWER ADMINISTRATION

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction		FY 1987
	Start	Stop	Estimate
Casper-Spence-Thermopolis 230-kV Transmission Line and associated facilities (continued)			
A construction contract was awarded in FY 1985 for the Spence-Thermopolis portion of the line for $11,248,031.			
Billings Microwave System	1st Qtr 1984	4th Qtr 1987	1,836,000
- Work will be completed on the Billings Microwave System. Western's total estimated cost for the Billings Microwave System is $11,887,000.			
Conrad-Shelby 230-kV Transmission Line	4th Qtr 1987	1st Qtr 1989	8,550,000
- Western plans to construct the new Conrad-Shelby 230-kV Transmission Line in Montana. This line will be approximately 30 miles in length, originating at the newly constructed Conrad 230/115-kV Substation, proceeding generally northward to a new 230/115-kV substation to be located near Shelby and connecting to the existing 115/69-kV transmission system.			
Presently, the electrical needs of Western customers in the Shelby/Cut Bank area of north-central Montana are served primarily by means of a single 115-kV transmission loop			

POWER SYSTEM DATA SHEET - 4
WESTERN AREA POWER ADMINISTRATION

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Conrad-Shelby 230-kV Transmission Line (continued)			

running from Conrad northwest to Cut Bank and then east through Shelby to Havre. Power system studies indicate an urgent need for improvements to the 115-kV loop. Under present and projected system heavy load conditions, the 115-kV loop cannot sustain the outage of either the Conrad-Cut Bank or Havre-Rudyard transmission line sections without experiencing low-voltage, overload, and loss-of-load conditions of the remaining portions of the loop.

An underlying 69-kV transmission system, which originates at Havre and continues west to Chester and south to its terminus at Fort Benton, supplies electrical service to a portion of the area load. System studies have also indicated a weakness in the 69-kV system. Opening this long loop at certain critical points results in low-voltage in the Chester area.

In the future, these conditions will exist not only when transmission system outages are experienced, but also when the system is fully operational. Construction of the Conrad-Shelby 230-kV Transmission Line and Terminal Facilities will correct the present problems in the Shelby/Cut Bank area, and those anticipated in the future, by providing additional capacity and relieving the low-voltage and outage conditions.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 5
WESTERN AREA POWER ADMINISTRATION

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Conrad-Shelby 230-kV Transmission Line (continued)			

In addition, this line will insure continued reliable service to customers in the area and will increase Western's transmission system reliability. The total estimated cost for constructing this line is $10.7 million.

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Casper-Dave Johnston 230-kV Transmission Line	4th Qtr 1987	3rd Qtr 1989	7,230,000

- Construction will be initiated on the Casper-Dave Johnston 230-kV Transmission Line and terminal facilities in central Wyoming. Western will construct approximately 15 miles of single steel pole, double circuit 230-kV line and 19 miles of single steel pole, single circuit 230-kV line from Western's Casper Substation to Pacific Power and Light Company's Dave Johnston powerplant. Portions of the existing lines between Casper Substation and Dave Johnston Substation will be removed and the new line will be built along the existing right-of-way, terminating at or near Dave Johnston powerplant.

The existing 115-kV wood pole transmission lines between Casper and Dave Johnston powerplant were constructed in the 1950's and are approaching the end of their expected service. Since these lines are essential elements in the area's present and future bulk power system, they will be

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Casper-Dave Johnston 230-kV Transmission Line (continued)			

in need of extensive rehabilitation or rebuilding within the next few years. Joint system studies between Western and the Rocky Mountain Transmission Study Group have identified a need for additional transmission capacity between Dave Johnston powerplant and the Thermopolis area in Wyoming. In addition, this area was identified by the North American Electric Reliability Council as not meeting required reliability criteria. The existing lines are subject to frequent loss of service due to their deteriorating condition and limited transfer capability.

The proposed Casper-Dave Johnston 230-kV Transmission Line will provide the additional capacity needed between Casper and Dan Johnston to make the most beneficial use of the Casper-Spence-Thermopolis 230-kV Transmission Line now under construction. In addition, the new line will be a major link in the overall plan to upgrade the transfer capability in Western's system between Colorado and Montana. Construction of the new Casper-Dave Johnston line will also provide voltage support to the underlying 115-kV and 69-kV systems, reduce local transmission losses and increase system reliability, both locally and in the overall system by strengthening one of the weaker links

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 7
WESTERN AREA POWER ADMINISTRATION

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction		FY 1987
	Start	Stop	Estimate
Casper-Dave Johnston 230-kV Transmission Line (continued) in the area's bulk transmission system. The total estimated cost for constructing this line and the associated terminal facilities is $8,979,000.			
AC-DC-AC Ties - Construction was completed on the Miles City Converter Station and related facilities in FY 1985. A construction contract, in the amount of $20,775,000, was awarded in August 1984 for the acquisition and installation of a 200-MW AC-DC-AC tie at Sidney, Nebraska. Prior year balances associated with the FY 1983 supplemental appropriation have been carried forward to FY 1985, FY 1986, and FY 1987 to fund the construction of the related AC connecting facilities, general expenses, construction supervision, and other minor contract costs. The FY 1987 request provides for completing construction activities. The total estimated cost of the Sidney DC Tie additions, including the related AC connecting facilities, is $25,890,715.	4th Qtr 1984	2nd Qtr 1987	710,000

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 8
WESTERN AREA POWER ADMINISTRATION

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Casper-Waltman 115-kV Transmission Line	4th Qtr 1987	3rd Qtr 1989	5,555,000

- Western proposes to remove the existing 46.6 mile Casper-Waltman 69-kV Transmission Line in central Wyoming and construct a new 49 mile 69/115-kV line. The new Casper-Waltman 69/115-kV Transmission Line will be primarily located along the existing right-of-way with approximately 12 miles to be constructed on new right-of-way to eliminate road crossings and numerous encroachments near Casper, Wyoming.

  The existing 69-kV line, which is an essential element in Western's central Wyoming transmission system, was constructed in 1949 using wood poles and small conductor. The poles and crossarms of the line are in the advanced stages of shell rot. In addition, the line was constructed without an overhead ground wire making it subject to numerous outages due to the lack of direct-strike lightening protection. The line is also subject to excessive power losses due to the inadequate size of the conductor.

  This line serves four taps which in turn deliver electric power to lower voltage distribution systems that provide electric service to consumers in communities, farms and ranches along the path of the line.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 9
WESTERN AREA POWER ADMINISTRATION

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	 Stop	FY 1987 Estimate
Casper-Waltman 115-kV Transmission Line (continued)			
Replacing the existing, deteriorated 69-kV line with the new Casper-Waltman 69/115-kV Transmission Line will provide more reliable service to customers in the area by reducing the number of outages caused by lightning strikes and reducing structural failures caused by the advanced deterioration of the poles and crossarms. By rebuilding the line with a larger conductor, and at a higher voltage, Western will reduce power losses and provide additional transmission capacity in the area. In addition, by upgrading this line Western will complete another phase of the overall plan to improve transfer capability and system reliability in central Wyoming. The total estimated cost for constructing the Casper-Waltman 69/115-kV Transmission Line and terminal facilities is $6.9 million.			
Blue River-Gore Pass 230/345-kV Transmission Line and Terminal Facilities	2nd Qtr 1986	4th Qtr 1987	601,000
- The Blue River-Gore Pass 230/345-kV Transmission Line, which is a part of the Hayden-Gore Pass-Blue River project in northcentral Colorado, will be completed in FY 1987. The total estimated Federal cost for constructing this portion of the line is $6,439,000.			

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 10
WESTERN AREA POWER ADMINISTRATION

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Transmission Lines and Terminal Facilities	Continuing		4,929,000

- Work will be completed on construction of the Devils Lake Area transmission facilities in North Dakota and the Watertown-Brookings No. 2 115-kV Transmission Line (South Dakota). Western will perform engineering studies and other preconstruction activities for Charlie Creek-Dickinson 230-kV Transmission Line (North Dakota), Blue River-Summit 115-kV Transmission Line (Colorado), Kremmling Tap-Windy Gap 138-kV Transmission Line (Colorado), Alcova-Seminoe-Archer 115-kV Transmission Line (Wyoming), Flatiron-Weld-Greeley-Beaver Creek 115-kV Transmission Line (Colorado), Lovell-Heart Mountain-Big George 115-kV Transmission Line (Wyoming), Flatiron-Estes 115-kV Transmission Line (Colorado), Buffalo Bill 69-kV Transmission Line (Wyoming), Lovell-Thermopolis 345-kV Transmission Line (Wyoming), Gering-Bayard 34.5-kV Transmission Line (Nebraska), Lovell (Wyoming)-Yellowtail (Montana) 230-kV Transmission Line, Granby-Windy Gap 138-kV Transmission Line (Colorado), Flatiron-Terry 115/230-kV Transmission Line (Colorado), Big George-Carter Mountain-Thermopolis 115-kV Transmission Line (Wyoming), and transmission improvements and modifications in western Kansas.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 11
WESTERN AREA POWER ADMINISTRATION

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Substations	Continuing		11,237,000

- Western will complete construction activities on Granite Falls Substation (Minnesota), Fargo Substation, Stage 11 (North Dakota), Casper Substation (Wyoming), and Maurine Substation (South Dakota). Western will continue to purchase and install various systemwide additions such as autotransformers, power circuit breakers, sectionalizing switches, and protective relays for miscellaneous facilities. Construction work will be continued on Boysen Switchyard (Wyoming) and Fort Morgan Substation (Colorado) additions. Construction activities will be performed for Bismarck Substation (North Dakota), Sioux City Substation (Iowa), Morris Substation (Minnesota), Dawson County Substation (Montana), Flandreau Substation (South Dakota), Wolf Point Substation (Montana), and Cheyenne Substation (Wyoming). Preconstruction activities will be performed on various facilities including: Bridgeport Substation (Nebraska), Seminoe and Kortes Switchyards (Wyoming), Willwood Substation (Wyoming), Hoyt Substation (Colorado), and Wiggins Substation (Colorado).

POWER SYSTEM DATA SHEET - 12
WESTERN AREA POWER ADMINISTRATION

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Other	Continuing		3,828,000

- Western will continue to purchase and install miscellaneous system additions, such as microwave equipment, telecommunications, Computer Aided Engineering equipment, and supervisory control equipment for substantially completed facilities. Construction activities will continue on the maintenance building additions to the Power Marketing Operations Complex (PMOC) in Loveland, Colorado, and the expansion of the PMOC in Loveland, Colorado to house crews performing functions related to communications, relay and metering, and construction materials testing.

  Construction work will be completed on a facility in Huron, South Dakota, for testing construction materials. This facility will also include a vehicle maintenance shop for the Huron District Office. Construction will be underway on the Casper (Wyoming) and Gering (Nebraska) Service Centers to provide shop buildings and warehousing facilities, and paving the warehouse yard at the Power Marketing Operations Complex in Loveland, Colorado. Pre-construction activities will be performed for additions to the service center in Brush, Colorado.

Total $45,969,000

Pick-Sloan Missouri Basin Power System (continued)

B. Management and Contracting

- Design and other preconstruction work will be performed by Western staff and outside contractors as required. Construction will be performed by contractor effort.

C. Prior Year Achievements

- Completed construction of Miles City Converter Station (Montana), Miles City Substation No. 3 (Montana), Thermopolis Substation Stage 05 (Wyoming), Fargo Substation Stage 10 (North Dakota), Watertown Operations Office building expansion (South Dakota), Valley City Substation (North Dakota), Frenchman Creek-Wauneta 115-kV Transmission Line (Colorado), Flatiron-Big Thompson Transmission Line (Colorado), Frenchman Creek Substation (Colorado), Huron Substation, Stage 13 (South Dakota), Sioux Falls Substation Stage 10 (South Dakota), Granite Falls Substation, Stage 11 (Minnesota), and Loveland Area Microwave Communication Towers (Colorado).

D. Current Year Planned Achievements

- Complete construction of White 345-kV Substation (South Dakota), Sidney AC tie facilities (Nebraska), Great Falls-Conrad 230-kV Transmission Line and Terminal Facilities (Montana), North Golden Lake Crossing (North Dakota), Fleming, Haxton and Sterling Substations (Colorado), Rolla Substation (North Dakota), Energy Control System in the Billings, Montana area, Montana Microwave Communication Towers, Phase I, the western South Dakota Communication System, Phase I, and the western North Dakota Communication System, Phase III.

Operation and Maintenance - General Statement

Summarized Financial Data:

Fiscal Year 1986	
Appropriation	$ 72,977,000
(Current Authority)	(72,087,000)
(Permanent Authority)	(890,000)
Application of Prior Year Balances	1,500,000
Subtotal	$ 74,477,000
Adjustment for Actual Unobligated Balances	4,401,261
Deferred (Treasury-Postal Reduction Act, FY 1986)	-72,000
Subtotal (direct program)	$ 78,806,261
Non-Federal Advances for Cosponsored Work	3,472,000
Total FY 1986	$ 82,278,261
Fiscal Year 1987	
Estimate of Appropriation	$ 85,905,000
(Current Authority)	(82,442,000)
(Permanent Authority)	(3,463,000)
Application of Prior Year Balances	267,000
Subtotal	86,172,000
Non-Federal Advances for Cosponsored Work	3,333,000
Total FY 1987	$ 89,505,000

The goals of Western's operation and maintenance (O&M) activity are designed to fulfill the objectives of the National Energy Policy of fostering an adequate supply of energy at a reasonable cost. Western's O&M activity is committed to providing reliable service and economical energy in a safe, cost-effective manner by maintaining continuity of service through a well maintained power system, maximizing the revenues gained from any surplus energy, and rapidly restoring service following any system disturbances.

Western performs Federal electric power marketing and transmission functions in 15 Central and Western States encompassing a 1.3 million-square-mile area, about 40 percent of the total area of the contiguous United States. In terms of the 8,758 MW of installed generating capacity it sells, Western is the third largest utility operation in the interconnected power system in the 15-State area. An additional 107 MW of installed generating capacity are scheduled to be added during FY 1986 and FY 1987, resulting from additional powerplants coming on line and rewinding of existing generating units.

Western sells power to customers consisting of cooperatives, municipalities, public utility districts, investor-owned utilities, Federal and State agencies, and irrigation districts. The wholesale power customers, in turn, provide service to millions of retail consumers.

Western is responsible for the operation and maintenance of more than 16,000 miles (13,000 miles under the appropriation-funded activity) of high-voltage transmission lines, over 200 substations, and for construction, rehabilitation, and O&M of additional Federal transmission facilities that may be authorized in the future. Western ranks among the top utility operations in the country in terms of miles of high voltage transmission lines and points of interconnection with other utilities. Roughly 80 percent of Western's O&M work is financed through annual budget authority in the form of appropriations. The balance of Western's power management and O&M expenses is financed with power revenues through a revolving fund--the Colorado River Basins Power Marketing Fund--which is described in later sections.

Electric power marketed by Western is generated at 49 hydropower plants which are operated by the Bureau of Reclamation (BuRec), the Corps of Engineers (COE), and the International Boundary and Water Commission (IBWC). One new powerplant (McPhee Powerplant in Colorado) is scheduled to be placed in service during FY 1987. Additionally, Western markets the United States entitlement from the Navajo coal-fired powerplant near Page, Arizona, and power generated at the Medicine Bow wind farm in Wyoming.

Western's power marketing function evolved over a period of years as BuRec, COE, and IBWC multipurpose water development projects were authorized. Each project is administered as an independent entity in terms of authorizing legislation, repaying the reimbursable portion of project investment, and in establishing power rates.

Western's power marketing revenues for each project must be sufficient to meet the cost of O&M of associated transmission and generation facilities, including purchase power and replacement cost, and to repay with interest the investment in Western's power facilities along with those of the associated Federal generating facilities. In addition, power revenues must help repay the investment in associated Federal irrigation facilities that is beyond the water users' ability to repay.

Accomplishments

- Energy sales data for FY 1985 related to this O&M activity were 32.235 billion kWh, resulting in gross power revenues of $399,405,000.

- Since its creation in 1977, Western has developed comprehensive marketing plans for projects where existing contracts for sale of Federal power expire. Each plan receives extensive public exposure. The plans help assure that Western carries out its role of marketing power in the public interest consistent with congressional intent.

- Western has implemented electric rate adjustments for all major projects in order to repay the Federal investment in a timely manner. Each rate adjustment also receives extensive public exposure and comment prior to approval mainly by the Federal Energy Regulatory Commission (FERC).

- Western maintains about 13,000 miles of transmission lines under this activity and over 200 substations and appurtenant facilities annually over a 15-State service area with infrequent outages. Only one power system disturbance reportable to DOE occurred in FY 1983, and none in FY 1984 and

FY 1985. The lack of reportable disturbances (i.e., loss of service to a significant number of customers) is a direct measure of Western's success in maintaining and operating a reliable power system.

- In FY 1985, Western relocated the Electric Power Training Center (EPTC) to facilities closer to its Headquarters Office. The relocation was required to accommodate new and upgraded equipment and for implementation of new training programs. The EPTC trains power system operators from the Federal and private sectors through lectures and an array of simulators for hands-on experience.

- Fiscal Year 1986 marked the first year of funding the Boulder Canyon Project under permanent budget authority granted in the Hoover Power Plant Act of 1984. Power receipts are available without further appropriation, but are subject to congressional limitation. Other power system projects under this appropriation are funded with current, rather than permanent, budget authority.

Objectives

- Estimated power sales for FY 1986 for this activity are 28.577 billion kWh and for the period FY 1987-1991 are 137.683 billion kWh. Projected power revenues for FY 1986 are $455,241,000 and for the FY 1987-1991 period are $2,391,514,000. Western will continue to market power at the lowest possible rates consistent with sound business principles and in accordance with applicable legislative and administrative requirements.

- During FY 1985, Western continued development of post-1989 marketing plans for the Salt Lake City Area and the Loveland Area which include the Colorado River Storage Project, Rio Grande Project, Collbran Project, Provo River Project, Pick-Sloan Missouri Basin Program-Western Division, and the Fryingpan-Arkansas Project. The new marketing plans and allocations are expected to be finalized in FY 1986.

- Rate studies are expected to be underway during the FY 1986 and FY 1987 period for the Boulder Canyon Project, Central Valley Project, Collbran Project, Colorado River Storage Project, Fryingpan-Arkansas Project, Pacific Northwest-Pacific Southwest AC Intertie, Parker-Davis Project, Pick-Sloan Missouri Basin Program, Rio Grande Project, Washoe Project, and for wheeling rates for the Central Valley Project and the Colorado River Storage Project.

- Western will use annual appropriations to continue to operate and maintain the high-voltage transmission system in accordance with electric utility industry standards for safety and effectiveness. Operational efficiencies will be enhanced with automated supervisory control equipment and upgraded telecommunications systems. From FY 1985 to FY 1987, Western will add eight new substations to its system. In addition, the new 200-MW AC-DC-AC tie will be in service at Sidney, Nebraska, representing completion of a major facility to interconnect power resources primarily east and west of the Rocky Mountains. An additional 372 circuit miles of transmission lines will be added to Western's system in FY 1986 and FY 1987.

- Wood-pole inspection and treatment activities will continue in many parts of Western's service area. Each pole is tested at selected time intervals to determine its condition. When it is cost effective, poles are treated as necessary to extend their life expectancy, thereby delaying the need for expensive replacements.

- Management improvements will continue to be implemented in order to increase efficiency of operations. For instance, in FY 1986, Western will begin to review operation and maintenance activities for productivity improvement. The productivity reviews will be undertaken along with the review of commercial activities for private sector performance to help maximize Western's efficiency through increased productivity in mission-critical O&M functions, such as power dispatching.

- Western will also fully implement an automated Financial Management System in FY 1987. The system will eventually be used by the other power marketing administrations (except Bonneville) and will become one of three primary DOE financial systems.

- Conservation and Renewable Energy (C&RE) activities will continue to provide support to Western's customers and further national energy goals.

FY 1987 Budget Request

Following is a table which compares the FY 1986 and FY 1987 activity by major O&M categories:

(Dollars in thousands)

Category	FY 1986 Activity	Change	FY 1987 Activity
1. Regular O&M	$ 64,538	$ + 3,953	$ 68,491
2. Replacement and addition of substation equipment, other equipment, and units of property	12,658	+ 3,466	16,124
3. Conservation & Renewable Energy	1,610	- 53	1,557
TOTAL O&M	$ 78,806	$ + 7,366	$ 86,172

The FY 1986 activity includes the use of about $5.9 million of available unobligated balances from prior years. The FY 1987 activity includes the use of deferred funds ($267,000) plus new budget authority ($85,905,000). A discussion of prior year accomplishments and budget justifications follows for each of the above categories.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET
WESTERN AREA POWER ADMINISTRATION
(Dollars in thousands)

Colorado River Storage Power System

	Estimated Total	Cumulative Prior Years	FY 1986 Estimate		FY 1987 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE): Design and Construction	$295,149	$107,166	$ 12,984	$ 49,474	$ 21,584	$ 25,551	$153,415
Total DOE obs/BO	$295,149	$107,166	$ 12,984	$ 49,474	$ 21,584	$ 25,551	$153,415
Non-DOE obs/BO Design and Construction	$153,202	$ 5,412	$ 1,020	$ 1,679	$ 4,730	$ 4,173	$142,040
Total Obligations/Outlays	$448,351	$112,578	$ 14,004	$ 51,153	$ 26,314	$ 29,724	$295,455
Method of Financing:							
Appropriations Available and Required			$ 11,331		$ 21,584		$153,415
Application of Prior Year Funds			$ 1,653		$ ---		$ ---
Non-Federal Advances			$ 1,020		$ 4,730		$142,040

POWER SYSTEM DATA SHEET - 2
WESTERN AREA POWER ADMINISTRATION

Colorado River Storage Power System (continued)

Description, Objective, and Justification

The transmission facilities of the Colorado River Storage Project include transmission lines, substations, switchyards, and other facilities to provide for the interconnection of storage project powerplants with each other, participating project power facilities, and other Federal powerplants. Western's transmission facilities also interconnect with the electrical facilities of the major investor-owned power companies in the Colorado River Basin area so that the greatest practicable amount of firm power and energy can be produced and delivered to the load centers for sale.

The objective of this project is to provide Western's customers with reliable electric power by increasing the transmission system's dependability, reducing inadvertant flows, and decreasing system line losses.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Western Colorado 345-kV Transmission System	1983	1st Qtr 1988	$ 6,360,000

- Construction will be continued in FY 1987 for the Western Colorado 345-kV additions. The total estimated cost is $127,821,739 of which Western's share is $72,644,629. This activity, which is financed jointly by Western and non-Federal entities, provides for the development of new and uprated transmission facilities in western Colorado and northern New Mexico, and includes transmission line construction and upgrade, substation modifications, and phase-shifting transformers.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 3
WESTERN AREA POWER ADMINISTRATION

Colorado River Storage Power System (continued)

A. Planned Activities

Activity	Construction Start	 Stop	FY 1987 Estimate
Glen Canyon-Flagstaff-Pinnacle Peak Transmission System	4th Qtr 1985	1st Qtr 1988	7,739,000

- Western is continuing the purchase and installation of equipment additions at Glen Canyon Switchyard, Flagstaff Substation, and Pinnacle Peak Substation in Arizona to increase the operating limit of the Glen Canyon-Flagstaff-Pinnacle Peak 345-kV Transmission Lines. The equipment additions consist of a 600 MVA, 230/345-kV transformer at Pinnacle Peak, a 300 MVA, 230/345-kV transformer at Glen Canyon, the replacement of the existing capacitor banks at Flagstaff and Pinnacle Peak with banks of increased capacity, and the addition of a 300 MVA 230-kV phase-shifting transformer at Glen Canyon.

  These additions will increase the power transfer capability in the Four Corners-Glen Canyon-Pinnacle Peak area of Arizona, reduce the inadvertant flows, and will increase system stability and reliability in that area. The increased transfer capability will be critical when the Rifle-Shiprock-San Juan-Four Corners 345-kV Transmission Line is completed. The total estimated cost of the additions is $21,680,000.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 4
WESTERN AREA POWER ADMINISTRATION

Colorado River Storage Power System (continued)

A. Planned Activities

Activity	Construction Start	 Stop	FY 1987 Estimate
Transmission Lines and Terminal Facilities	Continuing		5,448,000
- Construction work on the Paradox Valley Transmission Line (Colorado) and the Hayden-Gore Pass portion of the Hayden-Gore Pass-Blue River 345-kV Transmission Line will continue. This portion of the line will be constructed by Tri-State Generation and Transmission Association, Inc., with the Federal share being funded by the Colorado River Storage Project construction program. Preconstruction activities will be performed on Animas-LaPlata Transmission Line (Colorado), Craig (Colorado)-Bonanza (Utah) 345-kV Transmission Line, Dallas Creek Transmission Line (Colorado), Four Corners (New Mexico)-Shiprock (New Mexico)-Glen Canyon (Arizona) 500-kV Transmission Line, and Glen Canyon-Navajo 500-kV Transmission Line (Arizona).			
Substations	Continuing		1,052,000
- Western will continue the purchase and installation of minor equipment additions to existing facilities and will begin preconstruction activities on the addition of a storage building for Ault Substation (Colorado) and Weld Substation (Colorado). Construction will be completed on Glen Canyon Switchyard, Stage 03 (Arizona).			

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER SYSTEM DATA SHEET - 5
WESTERN AREA POWER ADMINISTRATION

Colorado River Storage Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1987 Estimate
Other	Continuing		985,000
- Western will continue the purchase and installation of minor equipment additions to existing facilities.			
	Total		$21,584,000

B. Management and Contracting

- Design and other preconstruction work will be performed by Western staff and outside contractors as required. Construction will be performed by contractor effort.

C. Prior Year Achievements

- Completed construction on Shiprock Substation, Stage 03 (New Mexico), Flaming Gorge Switchyard, Stage 03 (Colorado), and Great Cut Substation (Colorado).

D. Current Year Planned Achievements

- Complete construction of Supervisory Control and Data Acquisition modifications to the Power Operations Center in Montrose, Colorado; energy efficiency modifications to various substations in Colorado, New Mexico, and Utah; Cahone Substation (Colorado); Fairview Substation (Colorado); and Salt Lake City Area Microwave Communication Towers (Colorado).

1. Regular O&M

Western's request of $68,491,000 includes salaries, wages, and other expenses required to operate and maintain approximately 13,000 miles of transmission lines; over 200 substations and switchyards; and communications and control equipment. This amount includes expenses for system operations such as power marketing, dispatching, power billing, and collecting, and represents 79 percent of the FY 1987 request for O&M activities.

The increase of $3,953,000 between FY 1986 and FY 1987 is primarily due to the following:

- A major portion of the increase is attributable to the continuing shift of Western's administrative and general expenses (A&GE) from the construction activity to the O&M activity. For the past few years, Western has been implementing a policy of strict direct charging to activities whenever possible, coupled with a revised method of allocating A&GE in a more businesslike manner. The results of the policy have produced a greater share of A&GE allocated to the O&M activity. The revised method of allocation of A&GE is centered around the industry concept that administrative expenses are allocated on the basis of where employees' labor hours are charged. Western's analysis indicates that nearly 80 percent of labor hours are being directly charged to O&M activities, including revolving fund work. Previously, a greater share of A&GE was assigned to construction activities through use of other allocation methods. Western's method has received acceptance from the Inspector General and is consistent with methods used by Western's customers and other electric utilities in the United States. Therefore, Western's budget request in FY 1987 reflects this continuing shift of administrative expenses to the O&M activity.

- Price changes for goods and services are reflected in the FY 1987 estimate at a 4.3 percent increase.

- There are also higher costs of maintaining a power system at an acceptable industry-wide level of reliability and safety. Western's transmission systems are operated as an integral part of an overall interconnected transmission system. This requires increasingly closer coordination with all interconnected utilities and compliance with the operating criteria set forth by the North American Electric Reliability Council and its two member councils in which Western operates--the Mid-Continent Area Power Pool and the Western Systems Coordinating Council.

Deliverables as a result of power marketing activities during the period FY 1985 to FY 1987 are shown in the tables on the following page.

POWER SALES (in gigawatt hours) [1]

Project	Actual FY 1985	Est. FY 1986	Est. FY 1987
Boulder Canyon Project	8,828	5,000	5,000
Central Valley Project	8,852	8,407	8,419
Collbran Project	60	55	55
Falcon-Amistad Projects	227	291	291
Fryingpan-Arkansas Project[2]	0	0	0
Parker-Davis Project	1,765	1,324	1,207
Pick-Sloan Missouri Basin Program	12,385	13,380	12,784
Pacific Northwest-Pacific Southwest AC Intertie[2]	0	0	0
Rio Grande Project	118	120	120
TOTAL	32,235	28,577	27,876

POWER REVENUES (dollars in thousands) [3]

Project	Actual FY 1985	Est. FY 1986	Est. FY 1987
Boulder Canyon Project	$ 31,031	$ 23,593	$ 35,276
Central Valley Project	187,723	244,602	271,314
Collbran Project	1,179	1,212	1,258
Falcon-Amistad Projects	3,579	3,700	3,800
Fryingpan-Arkansas Project[2]	909	7,681	7,690
Parker-Davis Project	36,183	20,882	21,533
Pick-Sloan Missouri Basin Program	133,957	147,737	142,537
Pacific Northwest-Pacific Southwest AC Intertie[2]	2,164	2,172	2,172
Rio Grande Project	2,680	3,662	3,662
TOTAL	$399,405	$455,241	$489,242

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[1] One gigawatthour equals one million kilowatthours.

[2] Fryingpan-Arkansas Project and Pacific Northwest-Pacific Southwest AC Intertie show no power sales, but reflect revenues. The Fryingpan-Arkansas Project sells peaking capacity generated at Mt. Elbert pumped-storage powerplant to repay the investment of the project. The estimated power revenues are for sales of peaking capacity, and not gigawatthours of energy sales. For the Intertie project, there is no associated generation, thus no sales of gigawatthours of electric service are projected. The Intertie is for transmission of electricity only, and power revenues are from the transmission of energy produced by others.

[3] Revenue amounts reflect current repayment practices. Depending upon legislative proposals for modified debt repayment criteria, total revenues will not change significantly, although, individual project revenues may increase, decrease, or remain the same.

Generally, the rise in revenue over the 3-year period is attributed to additional revenues from scheduled power rate increases, particularly for the Central Valley Project. Specific details of each project follow:

° The estimates for energy sales of the Boulder Canyon Project from FY 1985 to FY 1986 decrease because of the methodology utilized for estimating energy available for marketing. According to the BuRec's projected hydrological studies, the energy available for marketing after FY 1985 will drop, because the water available for release will be significantly less for the subsequent time frame. Furthermore, after the FY 1987 time frame, all energy estimates for the Boulder Canyon Project will be based on allocations defined in the Hoover Power Plant Act of 1984. Because there were significantly higher amounts of energy available for sale in FY 1985, the associated revenues from the sale of this energy will also be significantly higher for the year. Although the initial repayment period for the Boulder Canyon Project will be completed in FY 1987, there will be additional cost incurred by the Bureau of Reclamation to train a staff to operate the powerplant, which is currently operated by the Southern California Edison Company and the City of Los Angeles. Costs of Hoover consolidation and upgrading work contribute to the increase in FY 1987 revenues. In addition, flood control costs will be recovered after 1987, along with costs for uprating of capacity. Also recovered will be the costs for the construction of air slots at Hoover Dam spillways to correct water turbulence problems. The cost of these items are factored into the revenue projections for the FY 1988 to FY 1991 time period which are shown on a table at the end of this submission.

° The Central Valley Project (CVP) energy sales for the FY 1985 to FY 1987 time frame are relatively constant. The power revenues from FY 1985 to FY 1987 are increasing steadily because of a series of approved rate increases. There is a small decline in power revenues for FY 1988 to FY 1991. The gradual decline in revenues is associated with sale of a lower quantity of surplus power to Pacific Gas and Electric Company energy Bank Account No. 2. The energy sales to Bank Account No. 2 are decreasing due to the increasing energy requirements of the CVP customers.

° The Collbran Project energy sales from FY 1985 to FY 1991 remain fairly constant. The power revenues from FY 1985 to FY 1986 increased because of an anticipated rate increase.

° Energy sales of the Falcon-Amistad Projects from FY 1985 to FY 1991 also remain fairly constant. The power revenues, however, are expected to increase due to recovery of higher operation and maintenance costs.

° Finalization of contracts in FY 1985 for marketing power from the Mt. Elbert pumped-storage powerplant on the Fryingpan-Arkansas Project creates a rapid rise in revenues during FY 1986 over FY 1985 revenues. Additional Fryingpan-Arkansas contracts are expected to be signed in FY 1986 which will produce additional revenues.

- Although the energy sales from FY 1986 to FY 1987 decline, the power revenues for the Parker-Davis Project increase for this same time frame. This increase in power revenues, without an associated increase in energy sales, can be attributed to an increase in the wheeling rate in FY 1987. The result will affect the power revenues but not the amount of energy sold to Western's customers.

- Energy sales and revenue estimates are fairly constant for the Pick-Sloan Missouri Basin Program, the Pacific Northwest-Pacific Southwest AC Intertie, and the Rio Grande Project. Variations for the Pick-Sloan and Rio Grande Projects are primarily a result of projected available resources estimated from hydrologic conditions on the river systems.

-Power revenues after FY 1987 are projected to level out to about $476 million per year.

Western implements project rate actions in accordance with project repayment criteria and public participation procedures. Western's rate study under this activity are associated with the Boulder Canyon Project, Central Valley Project, Collbran Project, Falcon-Amistad Projects, Fryingpan-Arkansas Project, Parker-Davis Project, Pick-Sloan Missouri Basin Program, Pacific Northwest-Pacific Southwest AC Intertie, Rio Grande Project, Washoe Project, and special situations, such as short-term sales of excess energy during a period of high water releases. Other rate studies under the Revolving Fund, which follow this section, are associated with the Colorado River Storage Project and the Colorado River Basin Project (Navajo).

In FY 1985, general rate adjustments were approved by FERC and are in effect for the Rio Grande Project and the Pick-Sloan Missouri Basin Program. Also approved was an adjustment for the Central Valley Project-Third Party Transmission, or transmission of Federal power to Western's customers over a third entity's transmission system. Rate adjustments are made periodically pursuant to formula or set methodology for the Boulder Canyon Project, Falcon-Amistad Projects, and the Colorado River Basin Project (Navajo).

2. Replacements and Additions

Approximately $16 million, or 19 percent of the FY 1987 request is for replacement and addition of substation equipment, transmission line rehabilitation, mobile equipment, communication and control equipment, and for minor additions to keep the system operable. Most of the equipment acquisition is of a recurring nature due to the excessive age of existing equipment or the high cost of maintenance. The activity also provides for replacement of tools and work equipment in garages, warehouses, and for power system testing and repair. The increase in funding from the FY 1986 level to the FY 1987 level is primarily attributed to the Hoover consolidation work in southern Nevada. About $3 million is scheduled for obligation in FY 1987. Old switchyard facilities at Hoover Powerplant will be removed and consolidated at Mead Substation. Mead Substation will become the delivery point for Hoover energy. Consolidation of transmission facilities from Hoover generating units will allow for more efficient operation of these units and will increase the reliability of deliveries to the Hoover allottees.

3. Conservation and Renewable Energy

About $1.6 million, or 2 percent of the FY 1987 request, is earmarked for C&RE activities. Western's overall C&RE program, including activities under the Revolving Fund, is budgeted at $3 million in the FY 1986 appropriation and $3 million in the FY 1987 request. These funding levels are consistent with growing customer participation through contractual requirements and increased Western emphasis on C&RE technology development. The C&RE program is designed to encourage customer consumption efficiency improvements and management practices which ensure that the available supply of hydropower is used in an economically efficient and environmentally sound manner. Western supports this concept with its internal C&RE activities as well as its customer oriented efforts.

Since FY 1982, Western has seen a steady growth in C&RE technology development. Currently, substantial emphasis is being placed on direct customer technical assistance, including such activities as: cost-shared economic analyses, feasibility studies, and preliminary design work; and equipment loans for heat loss detection, wind data collection, load monitoring, and irrigation pump efficiency testing. The C&RE program also provides customers with technical support contacts throughout the United States with whom they may discuss site-specific C&RE problems and obtain direct design or implementation assistance; presents a wide range of C&RE workshops, seminars and conferences; and provides an engineering service to analyze and define C&RE potentials for site-specific resource development. In addition to these major C&RE program elements, Western also develops and provides a number of resource documents, briefs, bulletins, and audio-visual materials.

The C&RE technologies involve a very wide range of conservation oriented applications, generation and transmission improvements, as well as solar, wind, cogeneration, small-scale hydropower, geothermal, and biomass resources. The Hoover Power Plant Act of 1984 placed increased emphasis on the C&RE program by requiring the development and implementation by Western's customers of an energy conservation program. Western has amended its existing regulations to reflect the elements to be considered in the energy conservation programs of its customers and Western's criteria for evaluating and approving such programs.

Purchase Power and Wheeling - General Statement

Summarized Financial Data:

Fiscal Year 1986	
Appropriation	$ 46,700,000
Application of Prior Year Balances	25,800,000
Subtotal	$ 72,500,000
Adjustment for Actual Unobligated Balances	1,184,599
Proposed Deferral	-16,371,000
Subtotal (direct program)	$ 57,313,599
Purchase Power and Wheeling Costs Offset by Credits From Sale of Power and From Rents For Wheeling Non-Federal Power on Western's Transmission Lines	122,874,000
Total FY 1986	$180,187,599
Fiscal Year 1987	
Estimate of Appropriation	$ 76,719,000
Application of Prior Year Balances	36,971,000
Subtotal	$113,690,000
Purchase Power and Wheeling Costs Offset by Credits From Sale of Power and From Rents For Wheeling Non-Federal Power on Western's Transmission Lines	91,210,000
Total FY 1987	$204,900,000

Western's major purchase power and wheeling requirement is associated with the Central Valley Project (CVP) in California. Western also purchases power or pays wheeling charges in connection with the Pick-Sloan Missouri Basin Program (P-SMBP), the Parker-Davis Project, and the Fryingpan-Arkansas Project. Western also purchases power and pays wheeling charges for the Colorado River Storage Project under the revolving fund.

The current marketing program for the CVP was initiated in the mid-1960's with the advent of the Pacific Northwest-Pacific Southwest Intertie (Intertie), which is used to import capacity and energy from the Northwest. The Intertie provides the CVP with 400 MW of transmission capacity. The Intertie, together with the continuation of the contractual arrangements with Pacific Gas and Electric Company (PGandE) under which the CVP hydrosystem is operationally integrated with the PGandE system, allows the CVP to serve a firm load greater than the load which the CVP hydrosystem could serve on its own. As a result of the integration contract with PGandE and the import of capacity and energy from the Northwest, the CVP is able to meet a system simultaneous demand of 1,152 MW.

The increase in load carrying capacity, which was initiated by the Pacific Northwest-Pacific Southwest Intertie, was the result of a program started by the Congress under which the CVP was obligated to meet the load requirements of certain customers within the service area until 1980 or until a maximum simultaneous load of 1,050 MW was reached. This obligation was further extended to 1,152 MW as a result of a lawsuit settlement which provided the City of Santa Clara with a firm allocation of power and under which PGandE agreed to support a higher load level.

The CVP hydrosystem alone cannot meet the capacity or the energy requirements of the system load. The inability to meet the energy requirements is further compounded by the uncertainty of water availability. Therefore, the CVP relies upon the energy banking arrangements in the integrated contract with PGandE, plus the purchase of energy from outside sources, to meet the energy requirements of its contractual commitments. Under the banking arrangement in any month, energy, generated or imported, which is surplus to the needs of the CVP is "banked" with PGandE under an arrangement which allows Western to purchase the energy back during months (generally September to April) when it is required to meet CVP contractual commitments. There are currently two energy bank accounts and one capacity account with PGandE. Energy Account No. 1 was "closed to additional deposits" in 1967 when the PGandE contract was renegotiated. The rate for purchase from that account was set at the average rate at which energy went into the account plus 15 percent. This rate is about 2.8 mills per kWh. At the same time, Energy Account No. 2 was initiated. The rate for energy from this account is based upon PGandE's current thermal production costs, less a credit for prior sales into the account, plus a service charge. The price of Energy Account No. 2 is currently estimated at 30 mills per kWh and the capacity account is estimated at $8.42 per kW month.

As of October 1985, the amount of energy in PGandE Energy Account No. 1 was about 5.3 billion kWh and with current projections, it will be depleted in FY 1988. PGandE Energy Account No. 2, which contains about 24.8 billion kWh according to Western's records, will expire in FY 2004 with the expiration of Contract 14-06-200-2948A with PGandE. The capacity account contains about 18,056 MW-months and will be depleted in the early 1990's.

The purchase of resources from other outside sources includes Western's replacement of the 400 megawatt Centralia contract which expired in December 1981. Power from the Centralia powerplant located in the State of Washington was used to meet CVP loads and was transmitted over Western's 400 megawatt entitlement on the Pacific Northwest-Pacific Southwest Intertie. In late 1981, Western decided to replace Centralia power after the Centralia owners indicated that they would not extend the contract.

Western initiated a search for replacement power prior to the expiration of the Centralia contract. Western's economic analysis of the various replacement power options was premised on acquiring resources that would be of a lower cost than purchases which would otherwise be made from the previously mentioned PGandE capacity and energy accounts over a 20-year period. A contract with Basin Electric for 185 MW of power was signed as a result. Deliveries are expected in FY 1986. The survey of resources for replacement power occurred at a time when Bonneville Power Administration (BPA) was forecasting less surplus power and Western's forecast of capacity and energy prices from its bank accounts with PGandE showed very high rates. Energy prices were based on oil at the then current price of $35 per barrel of oil and rising at 5 to 10 percent a year. Capacity projections included a component based on PGandE's capacity costs attributable to the Diablo Canyon Nuclear Plant in California.

As a result of later surveys, negotiations began with Longview Fibre and Tacoma City and Light, two Northwest entities. Contracts were executed with each in 1983 because of their competitive rates and long term benefits.

Although (BPA) is presently selling at rates below the current cost of these resources, they would at the time only guarantee power availability and advantageous rates for the short term. The long-term costs of the Tacoma and Longview Fibre contracts are expected to be lower than BPA's surplus, in future years, with longer availability. At the time these contracts were negotiated and executed, BPA was not contemplating sales at fixed rates for 20 years. Western will continue to rely on purchases of nonfirm power from BPA as long as surplus conditions exist.

It is important to distinguish the quality of the power needed by CVP versus the type of power associated with "nonfirm" rates. The resources needed by the CVP are baseload capacity and energy sources necessary to supply firm power to CVP customers. Rates for firm capacity and energy will normally be more than nonfirm energy rates, but assured availability justifies payment at the higher cost.

The CVP includes a backbone transmission system which provides transmission from the generating plants to the project load centers. In order to deliver power to the many preference customers, the integration contract with PGandE provides for wheeling service over the PGandE system. About 70 percent of the energy sold to preference customers is delivered over the PGandE system.

The CVP currently supplies approximately 9 billion kWh annually to meet project and preference customer loads. Of this amount, approximately 3.5 billion kWh are purchased either from PGandE energy bank accounts or from outside sources.

The P-SMBP marketing area includes the States of Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, North Dakota, South Dakota, and Wyoming. Under this program, capacity and energy are marketed in amounts which are essentially based on what is available from Missouri River hydro powerplants. The amount of energy to be marketed is determined on the basis of an average cycle of water years. Therefore, during periods of less-than-average water conditions, there is a need to purchase energy. These purchases are made from both public and private entities. During periods of above-average water conditions, both surplus capacity and energy are available. This surplus capacity and energy is marketed to customers on a short-term basis. Occasionally the surplus capacity and energy is marketed as maintenance energy to other utilities which have units down for maintenance and as emergency service to utilities which lose a generating unit. Excess capacity and energy is also marketed in the fuel replacement program.

The P-SMBP also, in some instances, provides firm energy to preference customers at a load factor greater than the project can generate during some time periods. Some of this additional energy is provided through purchases at the time of need. The rate for such additional energy is based on Western's cost to purchase such energy.

Annual energy sales from the P-SMBP average above 12.8 billion kWh with revenues of over $142 million. Firming energy requirements for the P-SMBP vary considerably from year to year depending on the amount of water available. During the last 5-year period, the annual requirement has approached

1 billion kWh with costs up to $17 million per year. Over 60 percent of the annual cost is covered by net billing arrangements in lieu of appropriated funds.

While the P-SMBP has an extensive transmission system, it also utilizes the systems of other utilities in the delivery of power and energy to some of its customers. In addition, a portion of the Federal transmission system is integrated with the other systems in the area into what is called the Joint Transmission System. This arrangement provides a means of making transmission capacity available in the area in the most efficient manner. Charges are established for use of the system and the revenues are divided among the participants based on each owner's proportionate share of investment.

Western also requires funds to pay for Public Service Company of Colorado wheeling charges to deliver Fryingpan-Arkansas Project power to customers. Additionally, Western requires funds for Parker-Davis Project firming power in the event of adverse water conditions on the Colorado River.

Another part of the purchase power and wheeling activity is the fuel replacement program. This program activity involves the displacement of oil- and gas-fired generation by using hydroenergy available through the flexibility and use of large reservoirs. Surplus low-cost thermal energy is purchased during the offpeak load period to supply Western's customers; this allows water to be stored in reservoirs for later use. Hydropower is then sold during onpeak load periods at 85 percent of fuel costs or at a split- or other shared-saving arrangement to customers who otherwise would use oil-, coal-, or gas-fired generation. The success of this program relates directly to the availability of offpeak economical coal-fired generation to couple with the hydrosystem for displacement of oil- and gas-fired generation.

Accomplishments

° Since 1972, revenues associated with sales from the fuel replacement program have amounted to over $573 million. These revenues were returned to the U.S. Treasury and applied to project repayment. Revenues from fuel replacement sales, in addition to those collected from normal power sales, have the effect of minimizing Western's firm power rate increases. These statistics include activity discussed in the Colorado River Basins Power Marketing Fund narrative statement.

Objectives

° To meet power delivery commitments to preference customers.

° To displace at least an estimated 6-9 million equivalent barrels of oil annually (about 4-6 million barrels are associated with activities within this appropriation).

FY 1987 Budget Request

The total purchase power and wheeling activity for FY 1987 is $204,900,000. This total consists of $76,719,000 of new budget authority, $36,971,000 of prior year carryover, $22,747,000 associated with net billing procedures, and $68,463,000 associated with other financing arrangements.

The total purchase power and wheeling activity increases by $24.7 million from FY 1986 (this includes application of $26.9 million of prior year balances from FY 1984 to FY 1986 and $36.9 million of prior year balances from FY 1985 to FY 1987) to FY 1987. New budget authority increases by $46.4 million (assuming that $16.4 million will be available to offset new budget authority in FY 1987), net billing decreases by $2.9 million, and other financing arrangements decrease by $28.8 million.

The primary reason for the increase in the total program and appropriation requirements is that Western will be purchasing more power from Basin Electric Power Cooperative in FY 1987. This will be the first full year of implementing the contract between Western and Basin Electric Power Cooperative for delivery of 185 MW of power. Western will reduce purchases from BPA in FY 1987 due to transmission limitations and BPA policy with regard to Northwest power sales. This will decrease nonappropriation transfers with BPA which have offset appropriation requirements in the past.

Western will continue other financing arrangements which include bill crediting. Bill crediting involves contractual arrangements with several of it's CVP customers where the customers agree to assume Western's contractual obligations to pay the purchase power supplier. Under this procedure, while Western would maintain the operational responsibility, the customers would make payment directly to the supplier and have their power bill credited in an amount equal to the amount paid by the customers to the power suppliers.

The purchase power and wheeling appropriation request is based on utilization of federally generated energy, assumption of average water conditions, energy support purchases to meet firm contractual obligations and use of banked capacity and energy in California, and wheeling charges to move power from supplier to customer.

Western must also continue to purchase energy to meet obligations in the Missouri River Basin and Parker-Davis Project areas due to seasonal fluctuations in the hydrosystems.

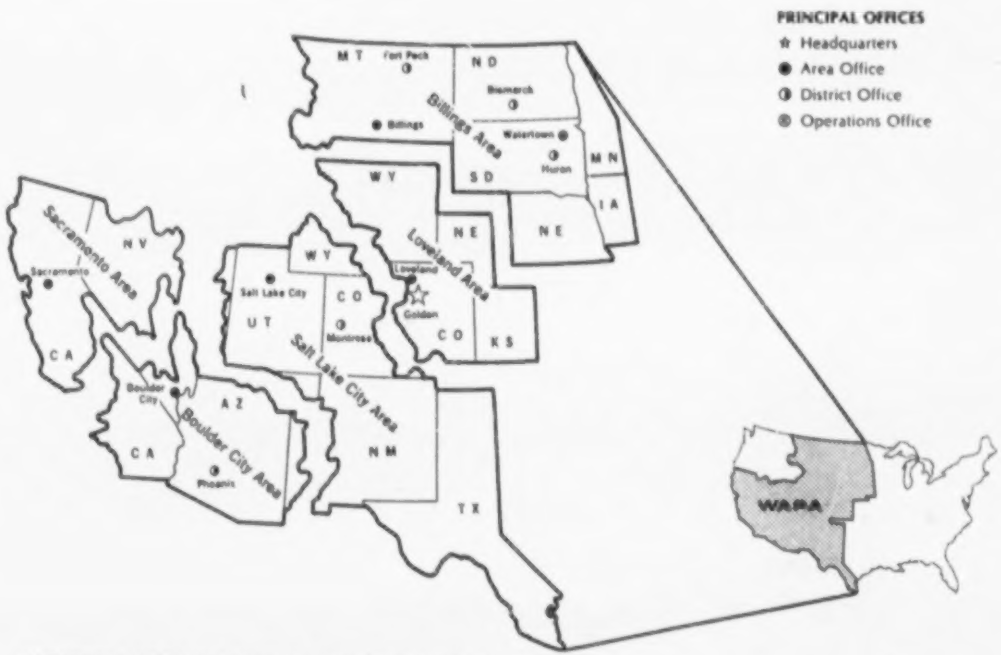
This program also provides for continuing participation in the fuel replacement program. In addition, the plan provides for the customer load coordination efforts through energy transfers between river basins by displacing current oil- and gas-fired generation. This program seeks, within the limits of water use constraints and transmission limitations, to integrate the dispatch of area hydro and thermal generation in the most economic manner to meet area load obligations.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SYSTEM STATISTICS
WESTERN AREA POWER ADMINISTRATION

	1985	1986	1987
Generating Plants (No.)	51	51	52
Generating Capacity:			
Installed Capacity (kW)	8,758,543	8,822,543	8,865,543
Substations:			
Number	234	239	242
Capacity (kVA)	13,775,564	14,868,556	15,888,564
Available energy: (MWh)[1]			
Net generation	41,999,000	32,420,007	30,293,007
Purchases	5,592,000	4,617,993	5,105,993
Energy available for marketing [2]	47,591,000	37,038,000	35,399,000
Transmission lines (circuit miles):			
500 kV	94.27	94.27	94.27
345 kV	1,274.46	1,274.46	1,504.38
230 kV	6,455.48	6,620.48	6,700.11
161 kV	1,039.85	1,039.85	1,039.85
138 kV	317.79	317.79	317.79
115 kV	5,768.86	5,760.16	5,777.76
69 kV and below	1,168.35	1,168.35	1,056.95
Total circuit miles	16,119.06	16,275.36	16,491.11
Western revenues: ($ in thousands)			
Revenue from electric service	$613,623	$571,916	$589,174

[1] One megawatthour (MWh) equals one thousand kilowatthours (kWh).

[2] Excludes transmission losses.


PRINCIPAL OFFICES
☆ Headquarters
● Area Office
◐ District Office
◉ Operations Office
M T
Fort Peck
N D
Bismarck
Billings
Billings Area
Watertown
Huron
S D
M N
I A
W Y
N E
N E
Loveland Area
Loveland
Golden
C O
K S
W Y
Salt Lake City
U T
C O
Montrose
Salt Lake City Area
N M
T X
Sacramento Area
N V
Sacramento
C A
Boulder City
A Z
Boulder City Area
C A
Phoenix
WAPA

WESTERN AREA POWER ADMINISTRATION
POWER MARKETING AREAS

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT
WESTERN AREA POWER ADMINISTRATION

Project	State	No. of Plants	Installed Capacity-MW	FY 1985 Estimated Power-gWh	FY 1986 Estimated Power-gWh	FY 1987 Estimated Power-gWh
Power Marketed						
Boulder Canyon	AZ	1	0	707	704	702
	CA	0	0	7,343	3,514	3,518
	NV	0	0	778	782	780
Subtotal		1	1,417	8,828	5,000	5,000
Central Valley	CA	10	1,848	8,852	8,407	8,419
Subtotal		10	1,848	8,852	8,407	8,419
Collbran	CO	2	14	60	55	55
Subtotal		2	14	60	55	55
Colorado River Basin (Navajo)	AZ	1	547	942	364	135
	CA	0	0	2,851	844	135
	NV	0	0	98	0	0
Subtotal		1	547	3,891	1,208	270
Colorado River Storage .	AZ	1	1,135	1,331	888	888
	CA	0	0	1,821	566	566
	CO	3	208	2,442	2,028	2,028
	NV	0	0	1,205	376	376
	NM	0	0	1,428	1,085	1,085
	UT	2	113	2,303	1,739	1,739
	TX	0	0	23	22	22
	WY	1	10	912	549	549
Subtotal		7	1,466	11,465	7,253	7,253
Falcon-Amistad	TX	2	97	227	291	291
Subtotal		2	97	227	291	291
Fryingpan-Arkansas	CO	1	200	0	0	0
Subtotal		1	200	0	0	0
Pacific Northwest-Southwest Intertie	AZ	0	0	0	0	0
	CA	0	0	0	0	0
	NV	0	0	0	0	0
Subtotal		0	0	0	0	0

Project	State	No. of Plants	Installed Capacity-MW	FY 1985 Estimated Power-gWh	FY 1986 Estimated Power-gWh	FY 1987 Estimated Power-gWh
Power Marketed (Continued)						
Parker-Davis	AZ	1	240	924	781	712
	CA	1	60	399	199	181
	NV	0	0	442	344	314
Subtotal		2	300	1,765	1,324	1,207
Pick-Sloan Missouri Basin Program	CO	6	211	979	1,440	915
	IA	0	0	1,605	1,964	1,952
	MN	0	0	2,027	2,464	2,447
	MT	3	485	1,095	989	983
	NE	0	0	2,457	2,505	2,491
	ND	1	430	1,868	1,637	1,626
	SD	4	1,483	1,722	1,804	1,793
	WY	10	236	632	577	577
Subtotal		24	2,845	12,385	13,380	12,784
Rio Grande	NM	1	24	118	120	120
Subtotal		1	24	118	120	120
Subtotal, Power Marketed		51	8,758	47,591	37,038	35,399
Power Wheeled For Others						
Boulder Canyon		0	0	0	0	0
Subtotal		0	0	0	0	0
Central Valley		0	0	175	86	105
Subtotal		0	0	175	86	105
Collbran		0	0	0	0	0
Subtotal		0	0	0	0	0
Colorado River Basin		0	0	0	0	0
Subtotal		0	0	0	0	0
Colorado River Storage Project						
Subtotal		0	0	398	398	694
		0	0	398	398	694
Falcon Amistad		0	0	0	0	0
Subtotal		0	0	0	0	0

Project	State	No. of Plants	Installed Capacity-MW	FY 1985 Estimated Power-gWh	FY 1986 Estimated Power-gWh	FY 1987 Estimated Power-gWh
Power Wheeled For Others (Continued)						
Fryingpan-Arkansas		0	0	73	384	393
Subtotal		0	0	73	384	393
Pacific Northwest-Southwest Intertie	AZ	0	0	225	225	225
	CA	0	0	194	194	194
	NV	0	0	32	32	32
Subtotal		0	0	451	451	451
Parker-Davis	AZ	0	0	0	0	0
	NV	0	0	0	0	0
Subtotal		0	0	0	0	0
Pick-Sloan Missouri Basin Program		0	0	3,016	3,524	3,660
Subtotal		0	0	3,016	3,524	3,660
Rio Grande		0	0	0	0	0
Subtotal		0	0	0	0	0
Subtotal, Power Wheeled for Others		0	0	4,113	4,843	5,303
Summary						
Power Marketed and Wheeled for Others						
Boulder Canyon		1	1,417	8,828	5,000	5,000
Central Valley		10	1,848	9,027	8,493	8,524
Collbran		2	14	60	55	55
Colorado River Basin		1	547	3,891	1,208	270
Colorado River Storage		7	1,466	11,863	7,651	7,947
Falcon-Amistad		2	97	227	291	291
Fryingpan-Arkansas		1	200	73	384	393
Pacific Northwest-Southwest Intertie		0	0	451	451	451
Parker-Davis		2	300	1,765	1,324	1,207
Pick-Sloan Missouri Basin Program		24	2,845	15,401	16,904	16,444
Rio Grande		1	24	118	120	120
Total Power Marketed and Wheeled for Others		51	8,758	51,704	41,881	40,702

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF LITIGATION
WESTERN AREA POWER ADMINISTRATION

Basin Electric Power Cooperative v. Montana Public Service Commission, et al. Basin Electric Power Cooperative (Basin) filed suit in U.S. District Court in Billings, Montana, seeking a declaratory judgment that defendants Western and the Bonneville Power Administration (BPA) fully complied with the National Environmental Policy Act (NEPA) in preparing an Environmental Assessment of the BPA-Western Memorandum of Understanding (MOU) implementing the sale and transmission of 185 MW of power from Basin to Western. The Montana Public Service Commission (MPSC), also a named defendant, had earlier threatened to block the sale for alleged non-compliance with NEPA. Motions to dismiss were filed by both BPA and Western. The MPSC filed an Answer and Cross-Claim against both BPA and Western. The claim against Western was essentially that the Basin-Western contract, which provided for the 185 MW sale, was itself a major federal action requiring an Environmental Impact Statement under NEPA. On January 11, 1985, Judge Battin of the U.S. District Court for the District of Montana granted the United States' and Basins' motions for summary judgment. The decision is reported at 608 F.Supp. 772. The MPSC did not appeal the decision.

Arvin-Edison Water Storage District, et al. v. Hodel, et al. The plaintiffs were 11 irrigation and water storage districts located in the Central Valley of California. All 11 have power contracts with Western. The districts challenged Western's decision to allocate an additional 102 MW of power from the Central Valley Project (CVP), as well as the manner in which Western allocated that power. The districts also challenged the CVP rate increases, arguing that as irrigation districts they were entitled to CVP power at the "project use" rate, or alternatively, a separate irrigation customer rate that did not include any costs of interest, irrigation repayment, or purchased power. In short, the districts claimed that, as irrigators, they were entitled to a separate, lower rate and a greater preference in the allocation of power than other CVP customers. On March 28, 1985, Judge Harold H. Greene of the U.S. District Court for the District of Columbia granted the United States motion for summary judgment. The court held that reclamation law did not require that the plaintiff irrigation districts receive special treatment or a super-preference with respect to rates for or the allocation of CVP power. The decision is reported at 610 F.Supp. 1206. The districts did not appeal the decision.

Trinity County Public Utility District, et al. v. Hodel, et al. On September 19, 1984, Trinity County Public Utility District, Hayfork Valley Public Utility District, Calaveras Public Power Agency, and Tuolumne County Public Power Agency filed suit against Western. The districts have a first preference by law to an allocation of power from the Central Valley Project (CVP) as a result of the construction of the Trinity River Division of the CVP (for Trinity County PUD and Hayfork Valley PUD) and the New Melones Project of the CVP (for Calaveras Public Power Agency and Tuolumne County Public Power Agency). Plaintiffs Trinity County PUD and Hayfork Valley PUD sought special power rates which included only those costs attributable to the Trinity River Division; plaintiffs Calaveras Public Power Agency and Tuolumne County Public Power Agency sought special power rates which included only those costs attributable to the New Melones Project. On February 22, 1985, Judge Edward Garcia of the U.S. District Court for the Eastern District of California granted the United States' motion for summary judgment. Judge Garcia held that the plain language of the statutes did not grant to plaintiffs the right to a portion of the output of specific powerplants, or to special rates based only on the costs of those plants. The first preference that plaintiffs have is to an allocation of power from the CVP; in all other respects, plaintiffs are to be treated as other CVP power customers. Judge Garcia concluded that purchased power costs were an authorized cost of the integrated CVP power system, and that plaintiffs were not exempt by law from paying their share of those costs. The plaintiffs appealed the decision to the U.S. Ninth Circuit Court of Appeals, where oral argument was held on December 11, 1985. No decision has been rendered at this time.

City of South Sioux City v. Edwards. Four municipalities in Nebraska filed suit challenging Western's Post-1985 Marketing Plan for the Pick-Sloan Missouri Basin Program, Eastern Division, on a number of different grounds. Both Western and the plaintiff municipalities filed motions for summary judgment. Western asserted, among other things, that none of the plaintiff municipalities had filed their applications for federal power before the deadline. The municipalities alleged, among other things, that Western did not give adequate notice of the marketing plan. The municipalities sought an order requiring Western to allocate power to them, since, in their view, Western would have allocated power to them if they had applied on time. On May 20, 1985, Judge Warren Urbom of the U.S. District Court for the District of Nebraska granted the United States' motion for summary judgment. He ruled that Western's decision that plaintiffs were not eligible to receive power under the post-1985 Marketing Plan was not reviewable by the court. The decision was appealed to the U.S. Eighth Circuit Court of Appeals, where oral argument will take place in early 1986.

Utah Power and Light Company (UPandL), FERC Docket No. ER84-517-000. On July 30, 1984, UPandL asked the Federal Energy Regulatory Commission (FERC) to permit a $9,754,827 annual increase in the rates collected under its contracts with the United States for wheeling Colorado River Storage Project (CRSP) power in Utah. On August 22, 1984, Western filed a protest, motion to intervene and motion to reject the filing. An additional 22 Motions to Intervene were filed in the case on behalf of many CRSP customers, the State of Utah and the Sierra-Pacific Power. Western (and the CRSP customers) argued that the proposed rate increase is not permitted under the UPandL contracts or under Mobile-Sierra doctrine. According to the Mobile-Sierra doctrine, if contracts such as these do not authorize unilateral rate changes, the FERC may set a different rate only if it finds that a failure to do so would adversely affect the public interest. On September 28, 1984, the FERC sent a deficiency letter to UPandL stating that its filing had not met that test and requesting that UPandL either withdraw the filing or submit additional evidence. On October 12, 1984, UPandL submitted further information in response to the deficiency letter. On October 1, 1985, FERC Administrative Law Judge Jon Lotis ruled in Western's favor, holding that the fixed-rate contracts should not be changed. The matter is now pending before the full Commission.

Paul Aslakson v. United States of America. Suit for wrongful death brought by the parents of Timothy Aslakson, age 22, who was killed on June 22, 1982 when the mast of the sailboat on which he was aboard struck Western's 115-kV electric transmission line as it crosses a portion of Creel Bay on Devil's Lake, North Dakota. Plaintiffs initially filed a claim against Western under the Federal Tort Claims Act on March 10, 1983 seeking recovery in the amount of $1 million. Western denied the claim on April 27, 1983. Thereafter, the plaintiffs initiated this suit by filing the complaint on September 21, 1983 - again seeking recovery in the amount of $1 million. The United States' motion for summary judgment was granted by the U.S. District Court. The plaintiffs appealed to the U.S. Eighth Circuit Court of Appeals, where oral argument was held on December 13, 1985. No decision has been rendered at this time.

City of Santa Clara v. Herrington. In August 1985, the Cities of Palo Alto, Roseville, and Redding, California, and the Plumas-Sierra Rural Electric Cooperative (the Cities) filed a motion with U.S. District Court Judge Conti for an order confirming their interpretation of the meaning of the word "nonwithdrawable" in the Santa Clara settlement. The settlement was entered into in 1980 by Western, certain of its Central Valley Project (CVP) preference customers, and the Pacific Gas and Electric Company after the Ninth Circuit's decision in City of Santa Clara v. Andrus, 572 F.2d 660, cert. denied, 439 U.S. 856 (1978). As part of the settlement, Western allocated an additional 102 MW of power from the CVP. The Cities contended that the settlement prohibited Western from withdrawing power from them for any purpose. It is Western's position that the settlement did not address this issue, and that the preference customer parties to the settlement understood that Western could withdraw power from them for certain purposes. The United States filed a memorandum in opposition to the Cities' motion, contending that there was a substantial dispute of fact with regard to the meaning of the word "nonwithdrawable." The United States sought a ruling which would allow the parties to develop the facts in the case. On October 11, 1985, however, Judge Conti issued an order granting the Cities' motion. The United States has appealed this decision to the U.S. Ninth Circuit Court of Appeals.

Ramsey v. United States. The plaintiff, a Western employee, filed suit in the U.S. District Court for the District of Colorado, alleging discrimination and retaliation. Trial proceedings are underway.

Bulkeley v. United States. On November 22, 1985, the plaintiff, a Western employee, filed suit against Western in the U.S. District Court for the District of Colorado. The plaintiff alleges that he was deprived of an ownership interest in a privately-owned airplane without due process of law. No trial date has been set at this time.

United States v. Pony Express Corporation. The United States filed suit against Pony Express for monetary damages incurred as a result of Pony Express' alleged failure to deliver checks from Western's customers to the Federal Reserve Bank. A settlement has been negotiated, and approval of the settlement is pending.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY
WESTERN AREA POWER ADMINISTRATION
COLORADO RIVER BASINS POWER MARKETING FUND

(In thousands of dollars)

	FY 1985 Actual		FY 1986 Estimate		FY 1987 Request	
	BA	BO	BA	BO	BA	BO
Western Area Power Administration - Colorado River Basins Power Marketing Fund	---	$-69,561	---	$-56,144	---	$-44,844
Total, Western Area Power Administration - Colorado River Basins Power Marketing Fund	---	$-69,561	---	$-56,144	---	$-44,844

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
AMOUNTS AVAILABLE FOR OBLIGATION
WESTERN AREA POWER ADMINISTRATION
COLORADO RIVER BASINS POWER MARKETING FUND
(In thousands of dollars)

	FY 1986	FY 1987
Appropriation	$ ---	$ ---
Receipts and Reimbursements:		
Unobligated Balance, Start of Year ...	46,814	26,687
Unobligated Balance, End of Year	-26,687	-26,487
Power Revenue	147,534	126,800
Capital Transfer to General Fund	-81,000	-45,000
Total Obligations	$ 86,661	$ 82,000

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
POWER MARKETING - WESTERN AREA POWER ADMINISTRATION (CBR)

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Obligational Authority	FY 1986 Obligational Authority	FY 87 Base	FY 1987 Request	Request vs Base
Power Marketing - Western Area Power Administration-					
Revolving Fund (CRB) Operation and Maintenance Operating Expenses.....	$ 93,600	$ 86,627	$ 86,627	$ 82,000	$ -4,627
Total					
Operating Expenses...	$ 93,600	$ 86,627	$ 86,627	$ 82,000	$ -4,627
Colorado River Basins Power Mktg. Fund...	$ 93,600	$ 86,627	$ 86,627	$ 82,000	$ -4,627
Staffing Total FTEs	219	219	219	219	-0-

Principal Acts governing program:

Authorization:

P.L. 95-91, "The Department of Energy Organization Act of 1977"
P.L. 75-529, "The Fort Peck Project Act of 1938"
P.L. 84-485, "The Colorado River Storage Project Act of 1956"
P.L. 92-370, "Act of 1972," authorizing continuing work in the Upper Colorado River Basin
P.L. 90-537, "The Colorado River Basin Project Act (Navajo) of 1968"
P.L. 98-360, "Energy and Water Development Appropriation Act of 1985" (Navy Geothermal projects at Fallon, Nevada)

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
COLORADO RIVER BASINS POWER MARKETING FUND
(Dollars in Thousands)

FY 1986 Obligational Authority	$ 86,627
FY 1987 Base	$ 86,627
Program increases and decreases:	
Completion of construction work for replacement of the Fort Peck-Havre 161-kV Transmission Line	-1,162
Decrease in other replacement requirements	-1,685
Decrease due to reevaluation of estimates for purchase power costs for fuel replacement	-4,221
Decrease in requirement for interest payments	- 991
Net increase for transmission system operation and maintenance and conservation and renewable energy activities	+3,432
FY 1987 Requested Obligational Authority	$ 82,000

DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

ESTIMATED ENERGY SALES FOR FY 1985 THROUGH FY 1991 [1]

(in gigawatthours)[2]

PROJECT	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91
Boulder Canyon Project	8,828	5,000	5,000	4,527	4,527	4,527	4,527
Central Valley Project	8,852	8,407	8,419	8,497	8,507	8,510	8,510
Collbran Project	60	55	55	55	55	55	55
Colorado River Basin Project (Navajo)	3,891	1,208	270	0	0	0	0
Colorado River Storage Project	11,465	7,253	7,253	7,252	7,252	7,172	7,172
Falcon-Amistad Project	227	291	291	291	291	291	291
Fryingpan-Arkansas Project	0	0	0	0	0	0	0
Parker Davis Project	1,765	1,324	1,207	1,252	1,155	1,155	1,155
Pick-Sloan Missouri Basin Program	12,385	13,380	12,784	12,850	12,787	13,056	12,579
Pacific Northwest-Pacific Southwest Intertie	0	0	0	0	0	0	0
Rio Grande Project	118	120	120	100	80	61	61
TOTAL	47,591	37,038	35,399	34,824	34,654	34,827	34,350

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[1] Does not reflect the proposed privitization of Western's power systems which may be implemented in future years.

[2] One gigawatthour (gWh) equals one million kilowatthours (kWh).

DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION

ESTIMATED POWER REVENUES FOR FY 1985 THROUGH FY 1991 [1]

(Dollars in thousands)

PROJECT	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91
Boulder Canyon Project	$ 31,031	$ 23,593	$ 35,276	$ 32,500	$ 29,000	$ 23,000	$ 19,000
Central Valley Project	187,723	244,602	271,314	268,664	267,894	265,839	260,221
Collbran Project	1,179	1,212	1,258	1,258	1,258	1,258	1,258
Colorado River Basin Project (Navajo)	75,361	25,497	5,990	0	0	0	0
Colorado River Storage Project	138,857	91,178	93,942	96,214	97,066	84,309	85,935
Falcon-Amistad Project	3,579	3,700	3,800	3,900	4,000	4,100	4,200
Fryingpan-Arkansas Project	909	7,681	7,690	8,829	8,829	9,155	9,155
Parker Davis Project	36,183	20,882	21,533	22,656	21,783	21,783	21,783
Pick-Sloan Missouri Basin Program	133,957	147,737	142,537	145,409	144,715	145,055	136,362
Pacific Northwest-Pacific Southwest Intertie	2,164	2,172	2,172	2,172	2,172	2,172	2,172
Rio Grande Project	2,680	3,662	3,662	3,222	2,782	2,358	2,358
TOTAL	$613,623	$571,916	$589,174	$584,824	$579,499	$559,029	$542,444

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[1] Revenue amounts reflect current repayment practices. Depending upon legislative proposals for modified debt repayment criteria, total revenues will not change significantly, although, individual projects may increase, decrease, or remain the same.
Does not reflect the proposed privitization of Western's power systems which may be implemented in future years.

NARRATIVE JUSTIFICATION

The FY 1987 request of $82,000,000 reflects a decrease of $4,627,000 from the FY 1986 request of $86,627,000. The decrease is primarily due to a decrease in power system replacements and fuel replacement power purchases.

A detailed narrative justification for the Colorado River Basins Power Marketing Fund is provided below.

Operation and Maintenance - General Statement

Background:

The Colorado River Basins Power Marketing Fund encompasses the power marketing and transmission functions associated with the Colorado River Storage Project (CRSP), including the Seedskadee Participating Project; the Fort Peck Project in Montana; the Colorado River Basin Project (CRBP) in Arizona, including the Central Arizona Project (CAP) and the United States entitlement from the Navajo coal-fired powerplant near Page, Arizona; and the Navy Geothermal projects at Fallon, Nevada. Operation, maintenance, conservation and renewable energy (C&RE) activities, purchase power, and other power marketing expenses for these power systems are financed from revenues from the sale of electric energy and capacity. Power sales and other revenues which are collected in excess of expenses are used to pay interest and for repayment of investments to the Treasury.

Definition of the Revolving Fund:

The Colorado River Basins Power Marketing Fund is a Federal Public Enterprise Revolving Fund. The fund is credited with collections from the sale of electric power and energy that is earmarked to finance a continuing cycle of business-type operations for certain power projects. The FY 1987 request of $82,000,000 is an obligational authority limitation only. Each fiscal year's amount represents Western's estimate of obligations to finance the CRB business-type operations. Budget authority was granted in the power projects' substantive legislation. Therefore, budget authority is always available, and does not require current congressional appropriation action. Specifically, the following language is in the substantive legislation for each of the four power projects under this account:

- ° P.L. 84-485 - Section 5 established the Upper Colorado River Basin Fund and states in part ". . . All revenue collected in connection with the operation of the Colorado River Storage Project (CRSP) and participating projects shall be credited to the Basin Fund, and shall be available, without further appropriation, for defraying the costs of operation, maintenance, and replacements of, and emergency expenditures for, all facilities of the CRSP and participating projects . . . ."

- ° P.L. 75-529 - Section 10, established a continuing fund providing in part ". . . All receipts from transmission and sale of electric energy generated at the Fort Peck Project shall be covered into the Treasury of the

United States to the credit of miscellaneous receipts, save and except that the Treasury shall set up and maintain from such receipts a continuing fund of $500,000, to the credit of the Bureau of Reclamation and subject to expenditure by it to defray the operating expense of generation and transmission of power delivered to the Bureau of Reclamation for disposal under this Act, to defray emergency expenses and to insure continuous operation . . . ."

- P.L. 90-537 - Section 403 established the Lower Colorado River Basin Development Fund. Subsection 403(d) provides in part ". . . All monies collected and credited to the development fund . . . shall be available without further appropriation for defraying the cost of operation, maintenance and replacement of, and emergency expenditures for all facilities of the projects . . . ."

- P.L. 98-360 provides "That all revenues collected in connection with the operation of Navy Geothermal projects at Fallon, Nevada, . . . shall be available to the Secretary of Energy, without further appropriation, for payment of energy costs, contract administration costs, and the design, construction, operation, maintenance and replacement, and administrative costs of all required transmission facilities and power marketing activities directly associated with the Fallon, Nevada, Navy Geothermal projects." Due to slippage in test generation, estimates of the available resource are very tentative. The Navy plans to rebid the project after recent termination of a joint venture contract with a geothermal power development company. Therefore, there are no estimates of obligational authority, power sales, and power revenues provided in this budget request.

Objectives:

- To continue to operate and maintain a reliable electric power system including over 3,000 miles of Western's total of 16,000 miles transmission lines and associated substations and switchyards.

- To market existing and potential Federal power resources to about 20 percent of Western's customers at rates consistent with sound business practices and sufficient to meet annual operating expenses and repayment obligations.

- To plan and implement a C&RE program.

- To plan and manage energy supplies in accordance with national energy goals. To further this objective, Western will continue to market fuel replacement energy, saving the equivalent of millions of barrels of oil.

To achieve these objectives in FY 1987, Western requires obligational authority of $82,000,000. This program level is $4,627,000 below the obligational authority for FY 1986 due primarily to refinement of estimates for fuel replacement purchase power costs, and a lower level of expenditure for replacement items.

The following table illustrates the dollar changes in major categories in the FY 1987 obligational request as compared with FY 1986 obligational authority:

Category	FY 1986 Program	Change	FY 1987 Program
	(Dollars in thousands)		
1. Regular operation and maintenance	$15,838	$+3,379	$19,217
2. Purchase power and wheeling	28,000	-0-	28,000
3. Fuel replacement	29,221	-4,221	25,000
4. Replacement of substation equipment, other equipment, and units of property	8,656	-2,847	5,809
5. Interest expense	3,522	- 991	2,531
6. Conservation and Renewable Energy	1,390	+ 53	1,443
TOTAL	$86,627	$-4,627	$82,000

The total amount of estimated obligations is, in large part, based on estimates of hydrologic conditions affecting requirements to purchase power for firming energy and for fuel replacement energy. Therefore, Western's actual expenses may fall short of the requested obligational authority during years of above-average water conditions. Above-average water conditions will lessen the need to buy firming power from neighboring utilities, since Western is able to meet most of its firm power contractual needs from hydropower generation. An above-average water condition will also lessen the requirement to spend money for purchases of energy, as Western is more likely to displace oil- or coal-fired generation with its own surplus hydropower energy resources.

Likewise, expenses could exceed the requested obligation program during a year of extremely below-average water conditions. In such a case, Western may be required to request supplemental obligational authority to purchase energy to meet its firming power needs and to optimize revenue and fuel savings through fuel replacement efforts.

A discussion of prior year accomplishments and budget justifications follows for each category:

1. Regular Operation and Maintenance

The request of $19,217,000, or 23 percent of the FY 1937 program, is for regular power operation and maintenance activities including salaries and other expenses required to operate and maintain approximately 3,000 miles of transmission lines, substations, switchyards, communications, and control equipment. This amount includes expenses for system operations such as power marketing, dispatching, power billing, and collecting. Power revenues are also used to cover the Corps of Engineers' expenses for operation and maintenance of the Fort Peck Powerplant. The Bureau of Reclamation (BuRec) will continue to transfer to Western completed transmission facilities of the CAP for Western to operate and maintain.

Western's outlook for power sales and revenues during the period FY 1985 to FY 1987 are shown in the following tables:

POWER SALES (in gigawatthours) [1]

Project	Actual FY 1985	Est. FY 1986	Est. FY 1987
Colorado River Basin Project (Central Arizona)	3,891	1,208	270
Colorado River Storage Project	11,465	7,253	7,253
TOTAL	15,356	8,461	7,523

POWER REVENUES (dollars in thousands) [2]

Project	Actual FY 1985	Est. FY 1986	Est. FY 1987
Colorado River Basin Project (Central Arizona)	$ 75,361	$ 25,497	$ 5,990
Colorado River Storage Project	138,857	91,178	93,942
TOTAL	$214,218	$116,675	$ 99,932

The Fort Peck Project is operationally and financially integrated into the Pick-Sloan Missouri Basin Program. Therefore, Fort Peck Project power sales and revenues are included in the Pick-Sloan Missouri Basin Program power sales and revenue estimates discussed under the previous appropriation narrative justification.

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[1] One gigawatthour equals one million kilowatthours.

[2] Revenue amounts reflect current repayment practices. Depending upon legislative proposals for modified debt repayment criteria, total revenues will not change significantly, although, individual projects may increase, decrease, or remain the same.

The power sales and revenue estimates are changing for several reasons:

- The energy available from the CRBP is based upon an energy withdrawal schedule that is obtained from BuRec. This schedule indicates the amount of energy available to Western for marketing to layoff customers; i.e., customers who agreed to acquire power from the coal-fired Navajo Powerplant on an interim basis until energy is needed for pumping water along the CAP aqueduct currently under construction by BuRec. This energy has been decreasing since in FY 1985 due to increased CAP use, and there will be only a small amount of energy available for marketing in FY 1987 and beyond. The amount available will depend on actual needs of CAP and the final method of marketing this surplus energy.

- The FY 1985 energy sales of the CRSP are considerably higher than for the subsequent years' energy sales because of above-average water conditions. The additional release of water through the power plants in FY 1985 produced more energy for fuel replacement and other nonfirm energy sales. However, these conditions are not expected to continue past the FY 1985 time period. The decline in energy sales from FY 1989 to FY 1990 (see the power sales table at the end of this submission) is a result of an anticipated decrease in fuel replacement sales, as outlined in the post-1989 marketing plan for CRSP resources.

  The FY 1985 power revenues for CRSP are considerably higher than for the subsequent years' power revenues, because of the additional sales of fuel replacement and other nonfirm energy. These sales, however, are not expected to continue at the FY 1985 level for the subsequent years. The increase in power revenues from FY 1987 to FY 1988 is a result of an anticipated increase in the rate for fuel replacement sales. The decline in power revenues from FY 1989 to FY 1990 is a result of an anticipated decrease in the amount of energy available for fuel replacement sales.

Power revenues after FY 1987 are projected to level out to about $90 million per year.

Developmental work will continue in FY 1986 on power marketing criteria for the CRSP and other minor programs to determine the allocation of Federal power after 1989 when current contracts expire.

2. Purchase Power and Wheeling

About $28 million, or one-third (34 percent) of the FY 1987 request, is for power purchases from non-Federal utilities to meet deliveries of firm energy to Western's customers. The expense program is based on a below-average water year. Even though 1984 and 1985 were good water years yielding surplus hydropower, past experience with unpredictable precipitation requires that Western request obligational authority for purchase power to meet firm energy needs in the event of adverse water conditions.

3. Fuel Replacement

The estimate for fuel replacement obligational authority is $25 million, or 31 percent of the FY 1987 budget. Western's fuel replacement program under the revolving fund involves use of two resources--hydropower from the Federal system and purchased power from other utilities. Use of the two resources is coordinated, depending on hourly and seasonal water and power delivery schedules, to maximize fuel savings in the non-Federal sector as well as to produce funds to assist in repayment of the Federal investment in water and power projects.

Western's participation in the fuel replacement program is continually reassessed to provide for optimum participation based on water supply conditions, availability of energy, transmission capabilities, changes in customer generating capabilities, and other factors. As a result, annual program adjustments will be necessary depending upon the factors and conditions prevailing at the time planning estimates are made. The program exemplifies Western's continuing efforts with partnership arrangements with non-Federal interests to produce benefits for both parties, as well as to further national energy goals.

Fiscal years 1983 through 1985 were extraordinarily good years for hydroelectric generation in the West due to above-average precipitation. As a result, Western was able to market more hydroenergy than normal, assisting other utilities by displacing generation of electricity produced by their oil- and gas-fired powerplants. The following table illustrates past savings and future estimates for this fund:

Fiscal Year	Equivalent Barrels of Oil Saved
1983	4,000,000 (actual)
1984	6,000,000 (actual)
1985	6,000,000 (actual)
1986	3,500,000 (estimated)
1987	2,000,000 (estimated)

4. Replacements

Approximately $6 million, or 7 percent of the FY 1987 expense program is required to replace substation equipment, mobile equipment, communication and control equipment, and for minor additions to keep the system operable. Most of the equipment acquisition is of a recurring nature due to excessive age of existing equipment or high cost of maintenance. Mobile equipment such as line trucks and pole trailers, plus communications and control equipment will be replaced. The program also provides for replacement of tools and work equipment in garages, warehouses, and for power system testing and repair. Western will complete the cost sharing arrangement with the BuRec in FY 1987 whereby the BuRec will pay approximately one-third of the cost of a Supervisory Control and Data Acquisition system. This system will allow Western to more efficiently monitor and control generation, transmission, and delivery of power to its customers.

The requested amount for replacements in FY 1987 is close to $3 million less than FY 1986 due mainly to the replacement in FY 1986 of capacitors at Flagstaff Substation in Arizona and completion in FY 1986 of replacement of the Fort Peck-Havre 230-kV Transmission Line in Montana.

5. Interest

Interest on the unpaid investment in the Colorado River Storage Project facilities is less in FY 1987 due to significant capital transfer payments made in recent years as a result of surplus revenues produced during above-average water conditions.

6. Conservation and Renewable Energy

About $1.4 million, or 2 percent of the expense program is for C&RE activities. A discussion of Western's C&RE activities is provided in the preceding decision unit narrative statement.

DEPARMENT OF ENERGY

Proposed Appropriation Language

[Emergency] Continuing Fund, Western Area Power Administration

[The Treasury of the United States shall set up and maintain a continuing fund of $500,000 out of Western Area Power Administration deposits to the Reclamation Fund. Said continuing fund shall be available to the Western Area Power Administration to assure the continuous operation and maintenance of its power system during unusual or emergency conditions, within the meaning of the Act of June 26, 1948 (43 U.S.C. 502-03): Provided, That expenditures from said continuing fund shall be replenished from power revenues of the Project for which funds were expended on an unusual or emergency basis.] (Public Law 99-141, making appropriations for energy and water development, 1986.)

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
AMOUNTS AVAILABLE FOR OBLIGATION
CONTINUING FUND - WESTERN AREA POWER ADMINISTRATION - OPERATING EXPENSES
(In thousands of dollars)

	FY 1986	FY 1987
Appropriation	$ ---	$ ---
Receipts and Reimbursements:		
Unobligated Balance, Start of Year	613	613
Unobligated Balance, End of Year	- 613	- 613
Total, Obligations	$ ---	$ ---

DEPARTMENT OF ENERGY
1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

CONTINUING FUND, WESTERN AREA POWER ADMINISTRATION

The goal associated with the Continuing Fund is to ensure continuous operation of Western's electric power transmission system and provide reliable, uninterrupted electric power service to customers in the event of an unusual or emergency situation.

Emergency power system repairs were made to transmission line structures and substations damaged by severe flooding in the southern Arizona area during FY 1983 and FY 1984. No emergencies occurred in FY 1985.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
CONTINUING FUND - WESTERN AREA POWER ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1986 Base	FY 1987 Request	Request vs Base
Continuing Fund	---	---	---	---	---
Staffing Total FTE's	---	---	---	---	---

Authorization: P.L. 80-790; P.L. 99-141

Justification for the Continuing Fund:

The Continuing Fund is for the purpose of defraying expenses incurred because of unusual or emergency conditions such as damage to transmission lines or other physical failures or damages, acts of God, or of the public enemy, fires, floods, drought, strikes or freight embargoes, or conditions causing or threatening to cause interruption in power services.

Language was approved in the Energy and Water Development Appropriation Act for FY 1986 to provide permanent authority for a Continuing Fund to be maintained from Western Area Power Administration deposits to the Reclamation Fund.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
ANALYSIS OF OUTYEAR IMPACT
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
WESTERN AREA POWER ADMINISTRATION - OPERATING EXPENSES
POWER MARKETING - WESTERN AREA POWER ADMINISTRATION 1/
(In thousands of dollars)

	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991
Budget Authority					
Construction and Rehabilitation	$ 77,685	$ 90,000	$ 92,000	$ 95,000	$104,000
Operation and Maintenance	85,905	89,000	93,000	100,000	104,000
Purchase Power and Wheeling	76,719	126,000	135,000	219,000	290,000
Total, Budget Authority	$240,309	$305,000	$320,000	$414,000	$498,000
Outlays					
Construction and Rehabilitation	$ 83,909	$ 66,100	$ 93,900	$114,500	$113,600
Operation and Maintenance	83,400	88,600	92,500	97,200	104,500
Purchase Power and Wheeling	114,400	126,000	135,000	219,000	290,000
Total, Outlays	$281,709	$280,700	$321,400	$430,700	$508,100
Staffing					
Total FTE	1,160	1,160	1,160	1,160	1,160

1/ Does not reflect the proposed privitization of Western's power systems which may be implemented in future years.

DEPARTMENT OF ENERGY
OBLIGATIONS FOR CONSULTANT AND SERVICES
FY 1987 CONGRESSIONAL BUDGET
WESTERN AREA POWER ADMINISTRATION

Appropriation Number	Consultant Category	OBLIGATIONS (Dollars in thousands) FY 1985	FY 1986	FY 1987
89X5068	Consultant Service Contracts	---	---	---
	Advisory and Assistance Contract	$577	$658	$635
	Personnel Appointments	---	---	---
	Totals	$577	$658	$635

Narrative Comments:

Obligations primarily support Western's conservation and renewable energy program activities, particularly in the area of technology transfer to Western's power customers. Many of these contracts are cooperative agreements. They are cost-shared with electric utility customers in Western's service area who are interested in furthering conservation and renewable resources activities. Such study activities involving load management, solar, wind, and other activities have the potential of collectively adding substantial electrical capacity to customers' utility systems or influencing electrical demand. Other contracts include furnishing geological and environmental data to help Western plan the best siting and design of transmission line structures and substations. Western also expects to continue some contractor effort in the areas of development and implementation of the maintenance information system, plus power rates and ADP studies, and support services for right-of-way management.

Program Contact: Larry Harvey
Telephone No.: FTS 327-1562

DEPARTMENT OF ENERGY
OBLIGATIONS FOR CONSULTANT AND SERVICES
FY 1987 CONGRESSIONAL BUDGET
WESTERN AREA POWER ADMINISTRATION

Appropriation Number	Consultant Category	OBLIGATIONS (Dollars in thousands) FY 1985	FY 1986	FY 1987
89X4552	Consultant Service Contracts	---	---	---
	Advisory and Assistance Contract	$491	$560	$583
	Personnel Appointments	---	---	---
	Totals	$491	$560	$583

Narrative Comments:

Obligations primarily support Western's conservation and renewable energy program activities, particularly in the area of technology transfer to Western's power customers. Many of these contracts are cooperative agreements. They are cost-shared with electric utility customers in Western's service area who are interested in furthering conservation and renewable resources activities. Such study activities involving load management, solar, wind, and other activities have the potential of collectively adding substantial electrical capacity to customers' utility systems or influencing electrical demand. Other contracts include furnishing geological and environmental data to help Western plan the best siting and design of transmission line structures and substations. Western also expects to continue some contractor effort in the areas of development and implementation of the maintenance information system, plus power rates and ADP studies, and support services for right-of-way management.

Program Contact: Larry Harvey
Telephone No.: FTS 327-1562

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

DEPARTMENTAL ADMINISTRATION

VOLUME 5

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DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
ANALYSIS OF OUTYEAR IMPACT
COLORADO RIVER BASINS POWER MARKETING FUND
POWER MARKETING - WESTERN AREA POWER ADMINISTRATION
REVOLVING FUND (CRB) 1/
(In thousands of dollars)

	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991
Obligational Authority					
Operation and Maintenance	$ 82,000	$ 76,000	$ 76,500	$ 77,000	$ 77,500
Total, Obligational Authority	$ 82,000	$ 76,000	$ 76,500	$ 77,000	$ 77,500
Outlays					
Operation and Maintenance	$-44,844	$-76,700	$-81,300	$-59,300	$-59,000
Total, Outlays	$-44,844	$-76,700	$-81,300	$-59,300	$-59,000
Staffing					
Total FTE	219	219	219	219	219

1/ Does not reflect the proposed privitization of Western's power systems which may be implemented in future years.

WESTERN AREA POWR ADMINISTRATION
EFFECT OF NET BILLING AND OTHER FINANCING ARRANGEMENTS ON APPROPRIATION REQUIREMENTS FOR PURCHASE POWER AND WHEELING

(In thousands of dollars)

Fiscal Year 1986

Area/Project	Total Purchase Power & Wheeling Program	FY 1984 Carryover	Net Billing	Other Financing Arrangements	Appropriation Requirement
Sacramento Central Valley	$158,075	$-25,873	$-14,241	$-97,225	$20,736
Boulder City Parker Davis	1,600	---	---	---	1,600
Billings Pick-Sloan Missouri Basin Program	17,148	-1,097	-11,242	---	4,809
Loveland Fryingpan-Arkansas	1,544	-2	---	---	1,542
Pick-Sloan Missouri Basin Program	1,821	-13	-166	---	1,642
Grand Total	$180,188	$-26,985	$-25,649	$-97,225	$30,329 1/

1/ Based on the assumption that $16,371,000 of unobligated carryover funds from FY 1986 new appropriations of $46,700,000 will be available at the end of FY 1986 and carried forward to offset appropriation requirements in FY 1987.

WESTERN AREA POWER ADMINISTRATION
EFFECT OF NET BILLING AND OTHER FINANCING ARRANGEMENTS ON APPROPRIATION REQUIREMENTS FOR PURCHASE POWER AND WHEELING

(In thousands of dollars)

Fiscal Year 1987

Area/Project	Total Purchase Power & Wheeling Program	FY 1985 Carryover	Net Billing	Other Financing Arrangements	Appropriation Request
Sacramento Central Valley	$181,431	$-36,971	$- 9,890	$-68,463	$66,107
Boulder City Parker Davis	1,600	---	---	---	1,600
Billings Pick-Sloan Missouri Basin Program	18,507	---	-12,671	---	5,836
Loveland Fryingpan-Arkansas	1,542	---	---	---	1,542
Pick-Sloan Missouri Basin Program	1,820	---	-186	---	1,634
Grand Total..............	$204,900	$-36,971 [1]	$-22,747	$-68,463	$76,719

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[1] Assumes that $20,600,000 of unobligated FY 1985 carryover funds currently deferred and $16,371,000 of unobligated FY 1986 new appropriations will be carried forward into FY 1987 to offset requirements for new FY 1987 appropriations.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
FY 1987 OUTLAY ESTIMATES 1/
BY CATEGORY
(Dollars in thousands)

	Fiscal Years						
Category-B&R Code	1985	1986	1987	1988	1989	1990	1991
Construction, Rehabilitation, Operation, and Maintenance, CF0301........................	$189,957	$268,938	$281,709	$280,700	$321,400	$430,700	$508,100
Colorado River Basins Power Marketing Fund (Net), CF0302........................	-69,561	-56,144	-44,844	-76,700	-81,300	-59,300	-59,000
Total Outlays	$120,396	$212,794	$236,865	$204,000	$240,100	$371,400	$449,100

1/ Does not reflect the proposed privitization of Western's power systems which may be implemented in future years.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
FY 1987 PROPRIETRY RECEIPTS ESTIMATES [3]
BY ACCOUNT

(Dollars in thousands)

Account - Account No.	Fiscal Years 1985	1986	1987	1988	1989	1990	1991
Sale and Transmission of Electric Energy - Falcon Dam, 2245	$ 39	$ 32	$ 37	$ 37	$ 37	$ 37	$ 37
Sale of Power and Other Utilities not Otherwise Classified, 2249	30,203	25,253	27,900	27,900	25,800	27,800	27,700
Colorado River Dam Fund, Boulder Canyon Project, 5656 [1]	8,169	--	--	--	--	--	--
Sale of Electric Energy - Bonneville Power Administration - Reclamation Fund, 5000.26 [2]	(32,062)	(46,781)	(31,800)	(34,300)	(37,700)	(41,800)	--
Sale of Power - Western Area Power Administration - Reclamation Fund, 5000.27	279,141	249,423	321,200	319,700	311,400	303,500	327,400
Other - Reclamation Fund, 5000.28	1,778	1,958	3,000	3,000	3,000	3,000	3,000
Total Proprietary Receipts	$319,330	$276,666	$352,137	$350,637	$340,237	$334,337	$358,137

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[1] After January 1, 1985, receipts from the Boulder Canyon Project are deposited to Dept. of Interior receipt account 14x5656.

[2] Information only. Reported as Proprietary Receipt by Bonneville Power Administration.

[3] Does not reflect the proposed privitization of Western's power systems which may be implemented in future years.

Department of Energy

Proposed Appropriation Language

Departmental Administration

For salaries and expenses of the Department of Energy necessary for Departmental Administration and other activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the hire of passenger motor vehicles and official reception and representation expenses (not to exceed $35,000); [$410,366,000, all of which is available for fiscal year 1986 and shall] $151,082,000, to remain available until expended, [plus such additional amounts as necessary to cover increases in the estimated amount of cost of work for others notwithstanding the provisions of the Anti-Deficiency Act (31 U.S.C. 1511 et seq.): Provided, That such increases in cost of work are offset by revenue increases of the same or greater amount, to remain available until expended; Provided further, That moneys received by the Department for miscellaneous revenues estimated to total $244,228,000 in fiscal year 1986 may be retained and used for operating expenses within this account, and may remain available until expended, as authorized by section 201 of Public Law 95-238, notwithstanding the provisions of section 3302 of title 31, United States Code: Provided further, That the sum herein appropriated shall be reduced by the amount of miscellaneous revenues received during fiscal year 1986 so as to result in a final fiscal year 1986 appropriation estimated at not more than $166,138,000] together with not to exceed $251,947,000 to be derived from collections received as authorized by section 201 of Public Law 95-238, and which may be credited to this account, notwithstanding 31 U.S.C. 3302. (Public Law 99-141, making appropriations for energy and water development, 1986.

DEPARTMENT OF ENERGY

FISCAL YEAR 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

DEPARTMENTAL ADMINISTRATION

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1985 Actual	FY 1986 Estimate	FY 1987 Request
Office of the Secretary	1,630	1,603	1,860
Board of Contract Appeals	378	384	356
General Counsel	10,021	9,715	9,953
Inspector General	21,708	18,158	21,092
Management and Administration	125,978	121,540	140,147
Operations Offices	89,786	88,848	94,222
Minority Economic Impact	2,408	2,596	1,789
Policy Analysis and System Studies .	7,041	7,448	7,855
Congressional Affairs	4,183	5,116	4,915
International Affairs	4,033	3,939	5,790
Policy and Management	795	708	---
Cost of Work for Others	115,704	143,543	115,050
Subtotal, Departmental Administration	383,665	403,598	403,029
Miscellaneous Revenues	-123,609	-161,743	-143,428
Revenues Not Associated with Cost of Work	-102,026	-82,485	-108,519
Subtotal, Departmental Administration	158,030	159,370	151,082
Use of Prior Year Balances and Other Adjustments	-29,053	-9,051	---
Savings from FY 84 Initiatives	-375	---	---
Total, Departmental Administration .	$ 128,602	$ 150,319	$ 151,082

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Office of The Secretary

The Office of the Secretary assures the formulation, implementation, and articulation of energy policies, regulations and legislation as mandated by the President and enacted by law by Congress. This office serves as a focal point for ensuring that production, conservation and development of alternative energy sources adheres to United States energy policy and national security objectives.

The past year accomplishments and future year objectives are explained in each decision unit submitted by the Departmental program elements.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
OFFICE OF THE SECRETARY
Departmental Administration - Operating Expenses

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Operating Expenses	$1,630	$1,603	$1,603	$1,860	$257
Staffing Total FTE's	36	31	31	31	0

Authorization: P.L. 95-91

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
OFFICE OF THE SECRETARY
(In thousands of dollars)

FY 1986 Appropriation Enacted	$1,603
- Increased salaries and benefits funding for an appropriate level of support for the Office of the Secretary	$228
- Increased funding for travel in support of National energy goals and Departmental program and management initiatives	$27
- Provide training funds	$2
FY 1987 Budget Request	$1,860

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION

OFFICE OF THE SECRETARY

The FY 1987 Budget is $1,860.000 and supports 31 FTEs. This level of funding represents an increase of $257,000 over the FY 1986 adjusted appropriation. These changes reflect increases in salaries and benefits of $228,000 to adequately fund 31 FTE's. This will ensure that adequate direction is provided to Departmental programs and the Secretary's immediate office. Travel is increased by $27,000 to $220,000 in order to provide an adequate level of funding for the Secretary to travel both internationally and domestically in support of National energy goals and Departmental program and management initiatives. The request for FY 1987 also reflects $2,000 to provide special training programs for selected members of the Secretary's immediate staff.

As the principal spokesperson on energy for the Department, and principal advisor to the President, this Office must consistently present clear, concise and thoroughly researched guidance that not only impacts consumers and industry, but the Nation. This involves the administration of a large Federal agency, coordinating complex and various related and non-related programs into a cohesive and unitized organization to provide the Nation with energy research, development, and demonstration of energy technology, the marketing of Federal power, energy conservation, the nuclear weapons program, regulation of energy production and use, and a central energy data collection and analysis program.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
BOARD OF CONTRACT APPEALS
DEPARTMENTAL ADMINISTRATION

(Tabular Dollars In Thousands. Narrative Material In Whole Dollars.)

	FY 1985 Appropriation	Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request Vs. Base
Board of Contract Appeals	$ 378	$ 384	$ 384	$ 356	$-1
Staffing, Total FTEs	7	8	8	8	+0

Authorization: P.L. 95-563

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
BOARD OF CONTRACT APPEALS
DEPARTMENTAL ADMINISTRATION

FY 1986 Appropriation Enacted	$ 384
Decrease In Program Direction	-28
FY 1987 Budget Request	$ 356

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
MAJOR ACTIVITY OVERVIEW

BOARD OF CONTRACT APPEALS

The Board of Contract Appeals resolves contract disputes and related matters involving the Department and its contractors in a quasi-judicial manner. This function is performed pursuant to the Contract Disputes Act of 1978. In addition, this Board, by delegation of authority from the Secretary, acts specifically as: The Contract Adjustment Board on applications for extraordinary contractual relief under Public Law 85-804; the Invention Licensing Appeals Board on appeals involving the patent rights of the Department; the Financial Assistance Appeals Board on disputes involving grants, cooperative agreements, loan guarantees and other financial assistance arrangements; and, the Patent Compensation Board pursuant to the Atomic Energy Act of 1954. The Board may also act to resolve other quasi-judicial matters as assigned by the Secretary.*

The purpose of the Board may be categorized as follows:

a. Serving the needs of the Department for a good and effective working relationship between the Department and its contractors, grantees, licensees, etc., by providing an impartial forum for inexpensive and speedy resolution of disputes.

b. In a quasi-judicial manner, providing a means for coordinating those actions taken by its officials which result in factual or legal disputes -- before a dispute is appealed to a court a law.

c. Conserving both Department resources and other public and private resources by reducing the need for litigation before the Federal Courts.

d. Assisting in maintaining the credibility of the Department through a Board chartered to provide impartial, fair resolution of disputes.

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* For example, the conduct of environmental hearings.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

GENERAL COUNSEL

The goal of the General Counsel is to provide all necessary legal services to the Secretary and the Department including: Legal advice and review of actions encompassing the entire range of the Department's activities, with the exception of the FERC, and, the conduct of assigned programs and traditional legal functions such as litigation and the development of legislative proposals.

FY 1985 accomplishments include:

- Provided legal support to administrative and program offices.
- Conducted administrative and judicial litigation.
- Ensured consistency and legal sufficiency of Departmental regulations and proposed legislation affecting DOE.
- Administered and monitored employee conduct program activities.
- Conducted DOE's assigned program.

General Counsel Objectives for FY 1986 to FY 1987

The basic objective of the Office of General Counsel is to provide legal services to the Secretary and the Department. Specific objectives in addition to our wide ranging current responsibilities include:

- Ensure the effective and efficient implementation of the Competition in Contracting Act so that the Department's multi-billion dollar procurement activities are not unduly disrupted or hindered.
- Provide all legal resources necessary to assure the effective implementation of the Nuclear Waste Policy Act's provisions, culminating in the eventual selection of sites for the nation's first nuclear waste repositories.
- Bring the remaining EPAA programmatic litigation to a successful conclusion completing the action begun by the President in 1981 when petroleum price and allocation controls were abolished.

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Conference	General Reduction	Management Initiatives	Pay Cost Restoration*	FTE General Reduction	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
Departmental Administration									
Office of the Secretary	$ 1,643	$ -32	$ ---	$ 54	$ ---	$ -62	$ 1,603	$ ---	$ 1,603
Board of Contract Appeals	371	-1	---	27		-13	384	---	384
General Counsel	9,784	-29	---	325	---	-365	9,715	---	9,715
Inspector General	18,619	-91	---	325	--	-695	18,158	---	18,158
Management and Administration	141,608	-1,954	-14,501	1,788	-114	-5,287	121,540	---	121,540
OE	132,308	-1,954	-14,501	1,788	-114	-4,940	112,587	---	112,587
P&CE	9,300	---	---	---	---	-347	8,953	---	8,953
Operations Offices	90,059	-339	---	2,491	---	-3,363	88,848	---	88,848
OE	89,032	-339	---	2,491	---	-3,324	87,860	---	87,860
P&CE	1,027	---	---	---	---	-39	988	---	988
Minority Economic Impact	2,827	-153	---	27	---	-105	2,596	---	2,596
Policy Analysis and System Studies	7,427	-97	---	108	---	-277	7,161	+287	7,448
Congressional Affairs	5,197	-48	---	162	---	-195	5,116	---	5,116
International Affairs	4,758	-42	---	108	---	-177	4,647	---	4,647
Cost of Work for Others	149,110	---	---	---	---	-5,567	143,543	---	143,543
Subtotal, Departmental Administration	$ 431,403	$-2,786	$-14,501	$ 5,415	$ -114	$-16,106	$403,311	$ +287	$ 403,598
Miscellaneous Revenues	-161,743	---	---	---	---	---	-161,743	---	-161,743
Revenues Not Associated with Cost of Work	-82,485	---	---	---	---	---	-82,485	---	-82,485
Subtotal, Departmental Administration	187,175	-2,786	-14,501	5,415	-114	-16,106	159,083	+287	159,370

Department of Energy

FY 1987 Congressional Budget Request

Adjustments to FY 1986 Appropriations

	FY 1986 Conference	General Reduction	Management Initiatives	Pay Cost Restoration*	FTE General Reduction	Gramm-Rudman-Hollings Reduction	Subtotal	Comparability Adjustments	Adj. Approp. Total
Departmental Administration									
Addback of Proposed Rescission	$ -2,786	$ 2,786	$ ---	$ ---	$ ---	$ ---	$ ---	$ ---	$ ---
Savings from Management Initiatives (Prior Year Deobs)..................	-6,000	---	6,000	---	---	---	---	---	---
FY 1985 Deferral......................	-8,501	---	8,501	---	---	---	---	---	---
Transfer of Prior Year Balances.......	---	---	---	-5,415	---	---	-5,415	---	-5,415
FTE Clerical Reduction................	-3,750	---	---	---	3,750	---	---	---	---
FTE Clerical Addback from other Appropriations......................	3,636	---	---	---	-3,636	---	---	---	---
OE....................................	$159,447	$ ---	$ ---	$ ---	$ ---	$-15,720	$143,727	$ +287	$144,014
P&CE..................................	10,327	---	---	---	---	-386	9,941	---	9,941
Total, Departmental Administration....	$169,774	$ ---	$ ---	$ ---	$ ---	$-16,106	$153,668	$ +287	$153,955

- Support Departmental efforts concerning re-enactment of the Price Anderson Act which governs liability for nuclear incidents.
- Complete implementation of Regulatory Reform initiatives in order to minimize the burden of government regulations.
- Support Departmental initiatives to deregulate domestic natural gas markets so that competition can achieve equitable prices for consumers.
- Implement the President's Patent Policy so that Departmental intellectual property can be utilized fully by the public.
- Provide legal expertise to assure timely and equitable privitization of Federal commercial activities.
- Ensure that successful defenses are mounted in suits against the Department.

Department of Energy

OFFICE OF GENERAL COUNSEL

FY 1987 Congressional Budget Request

LEAD TABLE
(in thousands of dollars)

General Administration	FY 1985 1/ Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Reques vs. Ba
Program direction					
Support funding...........	1,407	1,107	1,107	1,198	+ 91
Personnel expenses........	8,599	8,608	8,608	8,755	+147
Total operating expenses....	10,006	9,715	9,715	9,953	+238
Staffing Level	186 2/	166 2/	166	166 2/	

Authorization: DOE Act, Pub. L 95-91

1/ Reflects transfer of $1,991,000 and 34 positions to the Economic Regulatory Administration to conduct enforcement litigation arising from the Emergency Petroleum Allocation Act.

2/ Departmentally approved staffing levels which do not reflect 4 FTE from the Nuclear Waste Fund for each of the fiscal years 1985, 1986 and 1987.

Department of Energy

OFFICE OF GENERAL COUNSEL

FY 1987 Congressional Budget Request

SUMMARY OF CHANGES
(dollars in thousands)

FY 1986 Budget request	$ 9,715
- Restore 5% pay reduction	+325
- Inflation adjustment for support services and travel (1.042% and 4% respectively)	+ 48
- Decrease in personnel expenses as a result of anticipated reduction in average grade and salaries	-135
FY 1987 Departmental request level	$ 9,953

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET
NARRATIVE JUSTIFICATION

In order to provide legal opinions, advice and services to all DOE activities (except FERC) $9,953,000, is requested to discharge assigned responsibilities of the Office of General Counsel during FY 1987. This is an increase of 238,000 over the FY 1986 level of $9,715,000. This amount excludes funding for FTE resource requirements associated with the implementation of the Nuclear Waste Policy Act. Resources for the Nuclear Waste Policy Act, P.L. 974-25, are provided under the justification for the Nuclear Waste Fund. Funds available for legal program activities are described below:

> Personnel Expenses - This level of funding includes $8,795 for salaries and expenses. These funds will be utilized for personnel compensation, personnel benefits, and travel, for a staffing level of 166 total FTE's for FY 1987, exclusive of 4 FTE from the Nuclear Waste Fund.

The General Counsel's expected utilization of the resources at the OMB Request Level and the benefits derived from such funds are more specifically explained and justified below:

> Deputy General Counsel for Programs - Of the total available, approximately 27 total FTE's or 16 percent will be utilized to perform legal work pertaining to the functions assigned to the Deputy General Counsel for Programs. These resources will be utilized in areas which include and directly pertain to:

- DOE's defense program areas and to DOE's programs involving nuclear energy, facility security, safeguards and international agreements concerning nuclear and non-nuclear energy research development - 8 FTE.

- Natural gas and mineral leasing issues, including natural gas legislation, natural gas imports and exports, natural gas regulations leasing of energy minerals and Federal lands coastal zone management, and land withdrawal matters - 7 FTE.

- Intervention in State and Federal regulatory proceedings to further designated DOE program and national energy policy objectives in electric and other regulated energy areas. Representation of the interests of DOE operations and research laboratories as utility customers in seeking to acquire electricity, and gas services at the lowest possible cost - 6 FTE.

- Federal Power Marketing activities - 3 FTE.
- Management, supervision and coordination of functions and activities assigned to the Deputy General Counsel for Programs 3 FTE.

Deputy General Counsel for Legal Services - Approximately 64 total FTE's or 38 percent of the resources provided will be allocated to the Deputy General Counsel for Legal Services for the conduct of assigned programs and for rendering legal support, advice and services to the Department in areas directly pertaining to:

- Domestic and international energy emergency preparedness and response, including statutorily required monitoring of certain International Energy Agency activities; domestic production, storage, refining and distribution of petroleum as part of the Naval Petroleum Oil Shale Reserve, and Strategic Petroleum Reserve Programs; Naval Petroleum Reserve; and imports and exports of petroleum, electricity and coal - 9 FTE.
- Conduct of the intellectual property program arising out of the Department's proprietary interests in patents, copyrights, trademarks and other intellectual property, including the implementation of modifications intended to accelerate the appropriate commercialization of the results of agency research and development - 14 FTE.
- Procurement contracts and financial assistance instruments to assure legal sufficiency and regulatory compliance; DOE's financial incentive activities; and legal services for nonnuclear R&D and program activities - 20 FTE.
- General Departmental legal activities, including legal advice in connection with matters arising under the Freedom of Information Act, the Privacy Act, the Federal Advisory Committee Act, as well as matters involving EEO, fiscal administration, delegation of authority, personnel, tort claims and investigations of the Inspector General - 10 FTE.
- Establishment and administration of the Department's employee conduct programs arising from the DOE Organization Act and the Ethics in Government Act and to provide oversight of DOE's intelligence activities - 8 FTE.
- Management, supervision and coordination of functions and activities assigned to the Deputy General Counsel for Legal Services - 3 FTE.

Deputy General Counsel for Litigation - Approximately 28 total FTE's or 16 percent of the total available will be utilized for discharging legal functions and responsibilities assigned to the Deputy General Counsel for Litigation. These resources will discharge legal functions pertaining to:

- General litigation, in conjunction with the Department of Justice, involving challenges to the Department's non-regulatory programs and activities, such as litigation concerning claims of radiation injury, tax, etc. - 17 FTE.
- Special litigation, in conjunction with the Department of Justice involving challenges to Departmental actions of a programmatic nature, such as termination of EPAA programs, Fuel Use Act challenges, etc. - 8 FTE. In addition, one FTE is anticipated from the Nuclear Waste Fund.
- Management, supervision, and coordination of the activities and functions assigned to the Deputy General Counsel for Litigation - 2 FTE.

Deputy General Counsel for Legislation and Regulation - Approximately 36 total FTE's or 21 percent of the total resources available will be allocated to discharge functions or perform tasks falling within the organizational area of responsibility of the Deputy General Counsel for Legislation and Regulations. These resources will be utilized to provide legal support and services directly pertaining to:

- Environment, health and safety, and Fuel Use Act (FUA) programs administered by the Department - 9 FTE. In addition, 3 FTE is anticipated to be funded from the Nuclear Waste Fund.
- Legislative drafting and review, coordination, and clearance, of legislative matters of concern to the Department - 12 FTE.
- DOE's review, oversight and coordination of the regulatory processes of energy conservation and renewable energy programs and activities - 9 FTE.
- Management, supervision and coordination of legal activities assigned to the Deputy General Counsel for Regulations - 3 FTE.

Other FTE Resource Requirements - Approximately 15 total FTE's or 9 percent of the total resources available will be utilized to discharge the executive direction and administrative support functions:

- Executive level direction, supervision and management of all activities assigned to General Counsel - 9 FTE.

- Provision of administrative support and services - 6 FTE.

Support Funding - Of the total funds available $1,198,000 will be utilized to cover estimated costs for the following General Counsel activities: domestic and foreign patent activities ($960,000); law library operations and related activities ($145,000); legal transcript services and the publication of legal documents ($75,000); and, funds for General Counsel's training activities ($18,000).

Department of Energy
FY 1987 CONGRESSIONAL BUDGET
MAJOR ACTIVITY OVERVIEW

Office of Inspector General

The purpose of the Office of Inspector General (OIG) is stated in Section 208 of Public Law 95-91, the DOE Organization Act. Section 208 (b) of the act lists the duties and responsibilities of the Inspector General in obtaining the goal of the Office.

(b) It shall be the duty and responsibility of the Inspector General -

(1) to supervise, coordinate, and provide policy direction for auditing and investigative activities relating to the promotion of economy and efficiency in the administration of, or the prevention or detection of fraud and abuse in, programs and operations of the Department;

(2) to recommend policies for, and to conduct, supervise, or coordinate other activities carried out or financed by the Department for the purpose of promoting economy and efficiency in the administration of, or preventing and detecting fraud and abuse in, its programs and operations;

(3) to recommend policies for, and to conduct, supervise, or coordinate relationships between the Department and other Federal agencies, State and local governmental agencies, and non-governmental entities with respect to (A) all matters relating to the promotion of economy and efficiency in the administration of, or the prevention of fraud and abuse in, programs and operations administered or financed by the Department, and (B) the identification and prosecution of participants in such fraud or abuse;

(4) to keep the Secretary and the Congress fully and currently informed, by means of the reports required by subsection (c) and otherwise, concerning fraud and other serious problems, abuses, and deficiencies relating to the administration of programs and operations administered or financed by the Department, to recommend corrective action concerning such problems, abuses, and deficiencies, and to report on the progress made in implementing such corrective action; and

(5) to seek and coordinate his actions with the actions of the Comptroller General of the United States with a view to avoiding duplication.

AUDITS

The OIG Office of Audits is responsible for the internal auditing of the Department of Energy. The mission includes contract audits and expanded scope audits in the areas of Financial and Compliance, Economy and Efficiency, and

Program Results as defined by the governing audit standards established by the General Accounting Office. The Office of Audits' goal is the prevention of waste, fraud and mismanagement. The Office of Audits independently evaluates DOE's operating and administrative programs including an assessment of the Department's financial and management control systems and procedures. Recommendations are made to management to correct areas where improvements are needed.

We view auditing as a service to management. Our audit program is designed to produce efficiencies and savings for each dollar spent. Beyond the benefits of good audit planning underlying our audit program, the effectiveness of our audit organization in assisting management depends largely on how well management understands the IG's role and how well audit recommendations are received and implemented. DOE Order 2320.2 ensures that a Secretarial position will be taken on all recommendations reported. When these recommendations are acted upon by managers, efficiencies and dollar savings accrue to DOE, and management can be credited with improving its effectiveness.

Our concern with effective planning has dictated that we carefully consider in advance of projected audit program implementation: (1) the DOE audit universe subject to our review; (2) the relative risks in waste, fraud and mismanagement associated with the various DOE programs and activities; and (3) the personnel and skill resources that we have at our disposal. In this manner, we have based our long and short term audit program planning on (1) selection of audit areas that will produce the maximum return for the resources expended, and (2) use of our available audit resources to the fullest extent.

Fiscal Year 1985 accomplishments included the issuance of 200 audit reports with a dollar impact of $40,765,803. Dollar impact of audits includes recurring annual savings, one-time efficiencies, recoverable amounts and cost avoidance. Dollar impact figures are:

Recurring Annual Savings	$22,986,900
One-time Efficiencies	$ 1,252,649
Recoverable Amounts	$ 8,487,168
Cost Avoidance	$ 8,039,086
	$40,765,803

Details of these figures are shown below.

Recurring Savings

Subject	Per Annum
Western Area Power Administration's Purchase of a Jet Fixed-Wing Aircraft	$129,000
Action Required to Adequately Control Overtime Compensation at the Department of Energy	$500,000
Segregation of Transuranic Waste at Rocky Flats Plant	$4,600,000
Bonneville Power Administration's Purchase and Use of Fixed-Wing Aircraft	$157,900
Overtime Costs for E.I. DuPont de Nemours and Company Employees at Savannah River	$1,600,000
Collection of Windfall Profit Tax for Crude Oil Sales at the Naval Petroleum Reserves in California	$500,000
Assessment of Charges under the Hydropower Licensing Program	$15,500,000
	$22,986,900

One-Time Efficiencies

Subject	Amount
Lease versus Purchase Determinations at the Chicago Operations Office	$55,097
Commercial Timesharing Costs at the Lawrence Livermore National Laboratory	$133,552
Acquisition of Computer Equipment for the Department's Accounting System	$699,000
Oil Overcharge Funds Distributed to the States of Colorado and Washington	$365,000
	$1,252,649
TOTAL (recurring and one-time)	$24,239,549

Management Commitments to Recover Funds

DOE	DCAA	TOTAL
$6,786,141	$1,701,027	$8,487,168

Cost Avoidance Dollar Accomplishments

DOE	TOTAL
$8,039,086	$8,039,086

Fiscal Year 1985 Total Dollar Impact	$40,765,803

- Examples of audits completed in Fiscal Year 1985 which resulted in management's commitment to more efficiently use funds and/or seek fund recoveries are:

  --Hydropower Licensing Program at the Federal Energy Regulatory Commission (FERC). FERC was not always billing licensees for administrative and land use charges as required by the Federal Power Act. Consequently, over $6,000,000 in costs incurred by the Forest Service and four other Federal agencies in administering the hydropower licensing program were not identified by or billed by FERC. The audit also disclosed that increases in land values over the last several years had not been reflected in FERC's current land use charges. We found that the use of current land values and interest rates could result in an additional $15,500,000 annually in billings to hydropower licensees. FERC officials agreed with our recommendations and took prompt action to (1) identify all Federal agencies incurring hydropower licensing costs and to task these agencies to provide appropriate evidence of these costs so that hydropower licensees could be billed accordingly and (2) revise Federal regulations to provide for land use charges to licensees of hydropower projects based on current fair market values and long-term Government borrowing rates.

  --Nuclear Waste Disposal Practices at Rocky Flats. This audit disclosed that the Department could save an estimated $4,600,000 by properly segregating and separately disposing of high-level and low-level nuclear waste. Low-level waste can be safely disposed of in shallow burial grounds at a significantly lower cost than the disposal of TRU. The audit noted that the Rocky Flats Plant was disposing of all nuclear waste as if it were the more hazardous TRU, resulting in higher overall disposal costs.

  --Overtime Compensation at the Department of Energy. This audit showed that weaknesses in the control of overtime practices cost the Department between $500,000 and $1,000,000 annually. DOE employees paid by the Headquarters Payroll Office averaged over $80,000 in overtime compensation each pay period from the beginning of 1982 through mid-1984. During the first 12 pay periods of 1984, one percent (84) of the employees received about 30 percent of total overtime compensation paid. Overtime approval procedures were not consistently followed, unnecessary overtime was scheduled, and internal controls were circumvented when payroll units failed to follow prescribed procedures. These weaknesses led to overtime abuses, including employees being paid overtime when no work was performed. Recommended actions included recovery of improper overtime compensation and modification of procedures and strict adherence to those procedures to prevent the continuation of such abuses.

--Audit of Selected Employee Relocation Payments. The review showed that $438,000 in billing adjustments had not been made as promised by Boeing. Although the Government had recovered $779,000 since the initial audit, management agreed to seek recovery of the remaining relocation costs and associated G&A expenses.

--Audit of the Department's Program for Making Contract Postaward Audits for Verifying Cost or Pricing Data. This audit revealed that such reviews were not being made. Based on a judgment sample, we selected 12 DOE contracts for postaward review and found six instances of apparent defective pricing with a total value of $442,000. We conservatively estimated that the implementation by DOE of a comprehensive program of making defective pricing reviews could result in a savings of over $1,000,000 per year.

Other Fiscal Year 1985 accomplishments include:

- Completed a major study of DOE audit needs and the resources required to meet those needs. The budget-based study provided a basic framework of information and recommendations as well as supporting methodology which is used to develop both long and short range plans for all audit work to be done under the general direction of the Inspector General.

- Developed and published the Department's fourth fully integrated annual workplan for all audits in Fiscal Year 1986. This plan includes audits by the Inspector General's Office and audits performed by the internal audit staffs of the contractors that operate the Department's Government-owned contractor-operated (GOCO) facilities.

- Continued responsibility for the Department's interaction with the Defense Contract Audit Agency (DCAA) and the Department of Health and Human Services on audits done for the Department by those agencies. In the case of the DCAA, about 250 preaward and postaward contract audits were completed in FY 1985. Regarding the postaward audit component, the Department reported management commitments to save over $1,700,000 in FY 1985 based on the results of the DCAA audits.

- Developed four new procedural manuals--Contract Audit, Audit Report, Audits of Federally Assisted Programs and Integrated Contractor Audit Manual--designed to standardize and improve the quality of our audit procedures and audit reports. The Integrated Contractor Audit Manual merits special note. This manual is designed to provide guidance for planning and making audits of the Department's integrated contractor operations. Through the development and publication of pertinent audit standards and audit programs, we have established a Departmentwide approach to audit the nearly fifty integrated contractors, irrespective of the audit organization performing the audit. These audits address specific integrated contractor functions such as cash management, materials management, procurement, support services, cash distribution and product cost system, and budget process and execution.

- Developed an Audit Information Management System (AIMS) designed to meet the unique information needs of the Office of Audits. This system, keyed to budget and planning codes, permits tracking of audit progress and status and comparison to audit program planning. It also includes information necessary to manage contracted audit services.

- Assumed responsibility for the annual financial and compliance audits of the Department's Uranium Enrichment Services Activity. This activity is responsible for worldwide commercial sales of enriched uranium valued at about $2,000,000,000 per year. The objectives of the audits are to certify the accuracy of the operating statements for the activity and to render an opinion as to the adequacy of the internal controls over the financial activities of the Uranium Enrichment program.

- Completed financial and compliance audits of 25 of the Department's 44 integrated contractors. Audits of 15 additional integrated contractors were in process or nearing completion at the end of the fiscal year. These audits provided assurance to the respective operations office managers and contracting officers that the cost incurred by the contractors were in accord with the terms of the contract. These audits also disclosed situations in which accounting controls were weak, incomplete or were not functioning as described. Specific audit emphasis was placed on such areas as check disbursements, access to assets, recording of transactions, cost controls and general accounting and financial reporting. These financial and compliance audits are of critical importance to the Department since the integrated contractors incur an annual cost of $7,000,000,000 which is reimbursed by the Department.

- Initiated reviews and audits of various Departmental financial and accounting systems and the automated components of these systems. This included a review of the Departmental Integrated Standardized Core Accounting System, the Departmental Payroll/Personnel System, and the Department's Business Management Information System.

- Made 20 desk reviews and quality assurance reviews of audit reports of grant instruments awarded by the Department and by other Federal agencies. These audits, performed by public accountants and state auditors, addressed key financial controls of the grantee agencies. This included financial statements, internal controls and implementation of grant compliance requirements. In addition, an audit was performed jointly by the DOE IG and the Department of Interior of grants awarded to the Virgin Islands' Government and to schools and hospitals in the Virgin Islands. Through 1984 about $3,900,000 of such grants had been awarded by the Department.

The major audit objectives for FY 1987 are presented below, without priority ranking. The objectives are as follows:

- To close some of the gaps in audit coverage of DOE's major programs and functions such as Defense Programs which in FY 1985 are expected to account for over 50 percent of the DOE budget.
- To increase audit coverage of ADP systems procurement and use. DOE manages 1/5 of all Federal computers with 4,400 computers driving over 3,300 automated systems. DOE's ADP hardware investment approaches $1,000,000,000 with an ADP software investment of nearly $10,000,000,000.
- To sustain improvement in program planning support and resource analysis procedures by providing the appropriate interdisciplinary skills essential to more effective planning.
- To plan, schedule, prioritize and initiate specific audits identified by our newly activated strategic, operational and tactical audit targeting system. That system will assess the nature, scope, trends, vulnerability and risks in the DOE universe of programs and operations.
- To continue to procure audit support for contract audits and ensure that contractors respond to requests for contract audits promptly and effectively. Our goal is to complete preaward audits within 60 days of request, or sooner if needed, and complete closeout of cost-incurred audits within 120 days for small contracts and 160 days for larger contracts. Interim cost-incurred audits are planned on an annual basis for large, long-term contracts.
- To approve annually net expenditure vouchers for GOCO's.
- To comply with our oversight responsibility of assigned State Agencies and associated CPA firms in accordance with OMB Circular A-128 "Audits of States and Local Governments." Perform desk reviews of CPA audit reports and check an adequate sample of grant audits.
- To respond promptly to requests for audit support for criminal investigations and participate in selected proactive joint audit and investigative work.
- To improve statistical sampling and quality control processing/editing at Headquarters and in each region.
- To improve ADP auditing skills through the use of outside audit services and to improve internal staff capabilities. This will involve the use of advanced ADP techniques to gather and analyze audit evidence.

- To improve the quality and efficiency of audits by upgrading the expertise of the onboard audit staff through the use of available training programs and, as necessary, developing new programs of instruction that meet the specific and changing needs of auditors.

- To share DOE's audit expertise and experience in Governmentwide projects sponsored by the President's Council on Integrity and Efficiency.

INSPECTIONS

The Office of Inspections conducts technical inspections of the Department's scientific and engineering programs and projects, and defense related activities, including production and surveillance. These inspections have the purpose of determining whether or not costs can be reduced, or management improvements made, without impairing the objectives of the program or project. Efficiency and economy in the Department's high dollar value programs and operations can and have been accomplished. For example, during Fiscal Years 1981 through 1984, recommendations made by the Office of Inspections, with which management agreed and implemented, resulted in cost avoidances of approximately $134,000,000. This performance represents about a $35 return for each $1 it cost the Department to support the inspections program.

Fiscal Year 1985 accomplishments include:

- Specific Cost Avoidances - The Office of Inspections stresses the need for aggressive followup to ensure that agreed upon actions resulting from prior inspections are, in fact, implemented. Recent actions demonstrate the need for and the value of a positive, aggressive followup program.

  The pricing mechanism for Naval Petroleum Reserve crude oil that is being transferred to the Department of Defense and then exchanged for refined petroleum products was questioned by our staff. As a result of our recommendations, first made in early 1982, the exchange agreement was modified in January 1985. The price of the crude was raised, bringing the price in line with those of the Department's open market sales. The increased price per barrel resulted in over $5,000,000 increased revenue to the Department during FY 1985. Equally important, this price increase is now being passed on by DOD to its refiners, therefore representing an actual increase in revenue to the Government, not just an interagency transaction.

  The Office of Inspections also continued to follow up major recommendations resulting from our inspection of the Waste Isolation Pilot Plant. In this report we concluded that significant cost reduction opportunities were achievable without impairing the objectives of the program. Since our report was released in June 1984, management has recently taken action to reduce the project's total estimated cost by $75,000,000, $40,000,000 of which represents savings identified by the Inspector General.

- Completed Inspections - The Office of Inspections completed three major inspections in Fiscal Year 1985. The first inspection addressed potential cost avoidance in the range of $200,000,000 in the planned expansion of the microelectronics capability at the Sandia National Laboratory. We recommended that construction on a $41,000,000 project be placed on hold and that a study of Sandia's long-term mission in the radiation-hardened microelectronics field be undertaken. Management did not accept our recommendations. We continue to believe that, by proceeding with the construction of the Radiation-Hardened Integrated Circuits Facility as planned, the Department has missed an opportunity to avoid unnecessary spending and to redirect Sandia's activities into more productive efforts. The second inspection addressed facilities revitalization projects at Sandia National Laboratory. Almost $127,000,000 in new facilities was proposed for weapons research and development upgrades without considering less costly alternatives such as refurbishing or modernizing existing facilities. As a result of our report, Defense Programs will require that facilities being requested after FY 1986 will be fully justified in light of other alternatives, and further, that these other alternatives, and the reasons for which they were not selected, will be fully documented. The third inspection was a classified assessment of nuclear safeguards and security at four DOE weapons facilities plus the Department's transportation system. Beyond the 97 actual findings that emerged and are in process of being corrected, we developed a unique methodology that will greatly impact future assessments in the allocation of some $2,000,000,000 in resources for improving security. Security personnel have indicated that this methodology represents a major contribution to their approach in addressing this complex problem, has already saved some development costs, and has the potential to introduce significant cost savings when integrated into their planned program for security upgrades. A fourth major inspection, which is in the process of being completed, addresses the Department's nuclear weapons testing program. In this report we are questioning the overall rationale and need for the planned nuclear weapons test revitalization program estimated to cost $600,000,000. Our review of the current capability of the weapons test complex has led to a conclusion that significant reductions in the planned revitalization program could be made without impacting the objectives of the program.

In addition to these inspections, the Office of Inspections has been responsive to citizen requests for information about Departmental programs. We have recently completed an indepth evaluation of enhanced oil recovery procedures at the request of a private citizen. Earlier this year we completed an evaluation of the Department's Gas Centrifuge Enrichment Program, also at the request of a private citizen. The Office of Inspections considers that being responsive to public requests for information is a significant element of our mission.

The major objectives of the Office of Inspections for Fiscal Year 1987 are as follows:

- To continue to improve use of the analytical hierarchy process for selecting programs and operations to be inspected.
- To develop an improved capability for analyzing systemic issues applicable to a broad range of Department programs.
- To reduce the time the professional staff needs to spend on a given inspection effort by using contractor personnel for preinspection survey and data collection.

- To further improve the inspections capability by adapting program and management evaluation methodologies being used by the private sector.
- To continue upgrading and sharpening the skills of the professional staff by providing increased opportunities for selected, specialized training.
- To direct more attention to analytical systems being used by the Department in support of major decisions affecting the technical quality or cost of programs.

INVESTIGATIONS

The Office of Investigations supervises, coordinates and provides direction for investigative activities relating to the promotion of economy and efficiency in the administration of, or the prevention or detection of waste, fraud or mismanagement in the programs and operations of the Department.

Fiscal Year 1985 accomplishments included six cases that resulted in seven convictions. Total investigative efforts resulted in recoveries totaling $167,094.

- Examples of some investigative cases follow:
    - A principal contractor was indicted in a United States District Court on 19 counts of violations of two sections of U.S. Code Title 18 (Crimes and Criminal Procedures) and the contractor's affiliate corporation was debarred. In December 1984 the Department issued notice to the contractor that effective February 1, 1985, he, as an individual, would be debarred from conducting business with the Department for a period of five years and that the previous debarment of his affiliate corporation scheduled to terminate October 18, 1985, would be extended until the contractor's debarment was terminated.
    - In two cases involving abuse and misuse of the Federal Telecommunications System (FTS), three DOE employees acknowledged that they had used the FTS to make personal long distance calls and voluntarily repaid the Department. Both cases were also referred to the appropriate supervisors for action.
    - An official was indicted for embezzling DOE funds by inflating the price of storm windows, doors and other weatherization materials sold to a Community Action Group. A second official was indicted for receiving money representing discount credit for weatherization materials purchased on his authority. Both individuals pled guilty and were sentenced. One was given a 2-year suspended sentence, three years probation, and required to make restitution of $5,956. The other was likewise given a 2-year suspended sentence, three years probation, and required to make restitution of $4,898.
    - One of our investigations concerned a $150,000 fixed price contract entered into by DOE with a company to conduct a test to recover energy from municipal waste. Our investigation disclosed that the contractor might have misrepresented facts in an effort to obtain funds. Our

investigation sparked thorough contractor operation reviews by program and procurement officials and resulted in a revised work statement and a cost savings of $75,937.

- In another investigation, a DOE contractor was alleged to have directed company employees to charge blocks of time to a DOE contract, even though the employees had not worked on the contract. As a result of our investigation, the contractor agreed to reimburse the Department $14,517 and a check for that amount was subsequently received.

- A travel voucher submitted by an employee when transferred to a new duty station claimed costs which appeared to be excessive, unreasonable and possibly fraudulent. Our investigation disclosed that the employee had submitted a claim for expenses of $14,352 and that $8,999 of that amount was claimed for 30 days temporary lodging and meals. Subsequently, $5,100 of the $8,999 claim by the employee was disallowed and $3,051 was withheld from the employee's retirement fund to be applied against an outstanding travel advance.

- We looked into the alleged misuse of official Government vehicles by a senior official. Our investigation disclosed that the official had used Government vehicles to attend functions not directly related to the narrow scope of the employee's official activities. The senior official voluntarily reimbursed the Government $492.

- One of our investigations resulted in a DOE employee being terminated from employment. In addition, an amount of $337 for unauthorized use of official telephones was offset from the employee's lump sum leave payment and two days of annual leave were deducted from the employee's accrued leave.

° Other recoveries included:

  - $8,000 to be repaid by a grantee and $25,000 to be repaid by the grantee's corporation in an incomplete project.

  - $494 settlement for a case involving falsification of personnel qualifications.

  - $322 repaid in a case involving abuse of FTS.

  - $310 reimbursement by a former DOE employee for unauthorized travel.

  - $38 reimbursement on meals by travelers to a conference.

The major objectives of the Office of Investigations for Fiscal Year 1987 are as follows:

° To develop an investigative case tracking system that identifies by appropriate analysis DOE programs or areas of activities that have historically been vulnerable to waste, fraud or mismanagement.

- To further implement a preventative investigative program that identifies recommendations to DOE managers for correction of systemic deficiencies that permit waste, fraud or mismanagement.

- To develop a program for identifying wrongdoing by Departmental contractors or grantees that may lead to their suspension or debarment.

- To develop those cases providing for monetary recoveries and/or penalties through civil action under the recently enacted Comprehensive Crime Control Act.

Accomplishments of these objectives will help fulfill the goals of applicable public laws, allow investigative resources to be used to their maximum potential, and alert pertinent Government agencies and the general public of abuses by contractors or grantees having financial relationships with the Government.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
OFFICE OF INSPECTOR GENERAL
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Appropriation	FY 1987 Base	FY 1987 Request	Request vs. Base
Inspector General					
Operating Expenses ...	$21,413	$18,158	$18,158	$20,842	+$2,684
Capital Equipment ...	295	---	---	250	+ 250
Total	$21,708	$18,158	$18,158	$21,092	+$2,934
Staffing					
FTEs	179	178	178	178	---

AUTHORIZATION: Section 208, Public Law 95-91

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
OFFICE OF INSPECTOR GENERAL

SUMMARY OF CHANGES
(In thousands of dollars)

FY 1986 Appropriation enacted	$18,158
Program increases and decreases:	
° Increase in salaries and benefits	+ 772
° Increase in travel	+ 309
° Increase in support services	+ 653
° Increase in contract audits	+ 2,033
° Increase in capital equipment	+ 250
° Decrease in DCAA contract support	- 1,083
FY 1987 budget request	$21,092

NARRATIVE JUSTIFICATION

INTRODUCTION

The Office of Inspector General's FY 1987 request is for $21,092,000, an increase of $2,934,000 above the FY 1986 request of $18,158,000. There are increases for salaries and benefits of $772,000, for travel of $309,000, for support services of $653,000, for contract audits of $2,033,000 and for capital equipment of $250,000. There is a decrease of $1,083,000 for DCAA contract support. The FTEs remain the same at 178. This decision unit reflects $333,000 in savings resulting from management initiatives in the areas of organization and staffing, administrative organization management and GS-11/15 grade reduction.

It should be noted that all of the budget estimates in this submission exclude any logistical support for field personnel. This support is to be budgeted for and provided by the field offices where OIG personnel are located.

AUDITS

The FY 1987 budget request for the Office of Audits is based on the comprehensive Audit Needs and Resource Assessment Study that was completed during FY 1985.

Five years of Departmental budgets and audit reports were analyzed. The audit universe was coded into 966 topics in program categories, such as Atomic Energy Defense, and 2,212 topics in cross-cutting functional categories, such as procurement. Then an estimate was made of the resources required to audit this complex array of categories. Staffing requirements for FY 1987 were specifically addressed in a followup to the major study.

The Office of Audits staffing stands at 99 full time equivalents (FTEs), with 44 additional staff-years of contracted audit support. In FY 1985, the Office of Audits issued 200 audit reports (other than DCAA). It is expected that this level of output will be maintained in FY 1986 and FY 1987.

The requested level for FY 1987 is 99 FTEs, the same as FY 1986. This will allow a modified response to the recommendations of the resource study. The resource study prioritized the program audit categories according to six factors: dollar size, dollar trend, prior audit results, sensitivity, vulnerability to waste, fraud and mismanagement, and programmatic needs.

The Office of Audits would attempt to react to the resource study by shifting its focus toward some of the underaudited program categories. However, this will be difficult because many functional audits are virtually mandated by procurement requirements and by the Federal Managers' Financial Integrity Act.

The Office of Audits will provide audit services for the agencies for which audit cognizance is assigned to DOE. It is estimated that the cost of this activity is approximately $200,000 per year.

We have requested $4,500,000 for DCAA procurement audits.

INSPECTIONS

The Office of Inspections conducts inspections of the Department's scientific and engineering programs and projects and defense related activities, including production and surveillance. These inspections have the purpose of determining whether or not costs can be reduced, or management improvements made, without impairing the objectives of the program or project.

The Office of Inspections has demonstrated that substantial cost avoidance, savings or increased revenues to the Department can be achieved as a result of the inspections process. In Fiscal Year 1985 alone, the Office of Inspections has claimed over $45,000,000 in savings (management commitments to more efficiently use funds) arising from inspections of the Waste Isolation Pilot Plant ($40,000,000) and the Naval Petroleum Reserves ($5,000,000). Going back further, during Fiscal Years 1981 through 1984, recommendations made by the Office of Inspections, with which management agreed and implemented, resulted in cost avoidance, savings or increased revenue of approximately $134,000,000, or a return of $35 for each $1 it cost the Department to support the inspections program. The following represents the type programs from which these savings were realized.

A Fiscal Year 1984 cost avoidance of $40,000,000 stemmed from our staff questioning the costs associated with the construction of Phase I of the Defense Waste Processing Facility at the Savannah River Plant. We recommended that an independent cost estimate be made of the prime contractor's estimate. The analysis resulted in a decrease of $40,000,000 in the estimated cost of the facility.

The Fiscal Year 1983 cost avoidance stemmed from three major inspections. First, the inspection of the Department's High-Level Nuclear Waste Immoblization Program resulted in a $7,000,000 savings. Our inspectors questioned the efficacy of spending this amount of money on the Alternate Waste Form Program. Management reviewed the requirement for this program and concurred with our recommendation. By doing so, they released $7,000,000 dedicated to this effort. Second, the inspection of the Department's Uranium Mill Tailing Remedial Action Program resulted in a cost avoidance of $19,300,000. We recommended procedural changes in evaluating health risks prior to initiating remedial action activities. We also noted that an excessive amount of analysis and engineering was being required for isolated patches of contaminated soil, that the large number of documents being prepared appeared to be unnecessary, and that there appeared to be duplication of work among the several contractors. The cost reduction study, conducted by the program manager at our request, confirmed that our observations were valid. Third, an inspection, in early 1982, of the Exchange Contracts involving crude oil produced at the Naval Petroleum Reserve resulted in a recommendation that had the potential of increasing the revenue to the Department by about $17,000,000 annually. Our inspectors concluded that the Department was not receiving the fair market value for the crude oil in the exchange process. Management agreed. After lengthy negotiations and continuous followup by our office, the exchange agreement was modified in January 1985. The price of crude oil was raised, bringing the price in line with those of the Department's open market sales. The increased price per barrel resulted in over $5,000,000 in increased revenue to the Department during Fiscal Year 1985.

Fiscal Year 1982 cost avoidances of over $40,000,000 stemmed from six major inspections. Our inspection of the Solvent Refined Coal Demonstration Program (SRC-II) was a catalyst to the termination of the program and a cost avoidance of some $30,000,000. Recommendations made in other inspection reports pertaining to Solid Waste Development, Inertial Confinement Fusion, Advanced Isotope Separation and the Space and Terrestrial Program accounted for over $10,000,000 in additional cost avoidances.

The Fiscal Year 1981 cost avoidance of just over $8,000,000 resulted from four separate reports ranging from a $7,000,000 cost avoidance in the Department's Blind Shaft Borer Program to an actual savings of $183,295 in the Department's Woodburning Heating Equipment Survey.

The wide variety of programs and projects inspected, and the opportunities found for cost avoidances, attest to the value and the need for an aggressive inspections program.

The requested level of 19 FTEs will support a continuation of the currently established inspection program of spot checking DOE programs. However, we will attempt to improve our selection of inspection targets by using a support service contractor to perform the preinspection survey function which will free full time Government employees to dedicate more time to the inspection process. Assuming reasonable support service contractor support, the Office of Inspections will be able to accomplish the following:

- A minimum of eight proactive inspections of DOE programs and/or projects.
- At least four systemic analyses of problems which appear to be applicable to a broad range of DOE programs and/or projects.
- Four, and possibly six, responses to significant "hotline" complaints.
- Minimal capability to provide technical support to other elements of the Office of Inspector General, and to respond to requests from private citizens, the Congress and top level DOE management.

In order to maximize the productivity of the FTEs in the requested level, project timing and the vulnerability of programs or projects selected for inspection must be carefully analyzed. Critical factors, such as the following, must be carefully considered:

- The probability that the results of the inspection process will make a timely contribution to a major program decision.
- The existence of schedule delays.
- The existence of cost overruns.
- The rate of change in funding.
- Requests by DOE management for review of a particular program or issue.

INVESTIGATIONS

The mission of the Office of Investigations is to supervise, coordinate, and provide direction for investigative activities relating to the promotion of economy and efficiency in the administration of, or prevention or detection of fraud and abuse in, the programs and operations of the Department. One major objective of the Office of Investigations is appropriate response to all allegations of fraud and abuse received by either referral within the Department, referral to other agencies, administrative disposition, or investigation. The Office processes about 400 cases a year. At our current staff level, backlog (cases opened but uninvestigated), is about 40, or about 10 percent of cases processed; thus, completion of all cases may not be timely and participation with FBI and DOJ may be limited. Another major objective mandated by statute is prevention of fraud and abuse in the Department's programs and operations. At the current Fiscal 1985 staff level, we have been able to assign additional investigators to field locations and thus have been able to augment our preventative investigation program with respect to: the conduct of vulnerability surveys, proactive investigations (cases opened upon leads developed within the IG Office rather than upon response to allegations received), identification of Departmental contractors/subcontractors and grantees for possible suspension/debarment proceedings, and recommendations for programmatic corrections of systemic deficiencies in Departmental activities.

At the requested level of 35 FTEs, which is the same as the Fiscal Year 1986 level, we will continue to have an investigative presence at each of the Department's Operations Offices. We have been able to implement our plan to further decentralize our field operations by strengthening our Regional Investigative Offices at Oak Ridge and Albuquerque. Due to having additional field investigators we have been able to provide more training, particularly in the area of procurement. We continue to believe that the statute mandating both the detection and prevention of fraud and abuse can be most fully accomplished by additional investigative staff at our current field locations and other sensitive Departmental field offices.

OFFICE OF EXECUTIVE DIRECTOR

The Office of Executive Director provides executive direction and support to the Office of Inspector General. Functions include budget preparation, justification and execution; responding to Freedom of Information and Privacy Act requests, congressional and media inquiries; providing policy coordination, liaison with the Congress and affiliated professional and oversight groups, and the planning, coordination, and execution of special project activities for the Office of Inspector General; providing management and technical support; and personnel and administrative support services.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

MANAGEMENT AND ADMINISTRATION

The Assistant Secretary, Management and Administration provides the essential management and administrative services necessary to support the Department's programs and missions in the most efficient, effective, and economical manner. The Assistant Secretary is the principal advisor to the Secretary on matters relating to the overall controlling and supporting functions for the Department's Headquarters and field components. Major areas of responsibility include organization, manpower and management systems; management and control of financial resources; personnel management, contractor industrial relations; equal employment opportunity and civil rights activities; automated data processing management and acquisition; management information system development; telecommunications management; in-house energy management; program/project, construction and facility management; procurement, contracting and Federal assistance agreements; budget, accounting, payroll and financial control and verification; A-76 review and approval; freedom of information; real and personal property management; printing and graphics services; building and engineering support; space management; small business and disadvantaged business utilization; Federal employee occupational safety and health program; and providing a centralized repository and coordination activity for the Secretarial principals of the Department; as well as performing and supplying administrative services.

Significant recent accomplishments:

- Issued new and revised policy directives for employment-related programs, position classification, position management, pay and leave administration, performance management and recognition, industrial hygiene, the medical program, and military reserves. Implemented changes in personnel programs as new regulations or procedures were established by OPM or by statute.
- Expanded PAY/PERS payroll support to eight additional field payroll offices: Albuquerque, Chicago, Idaho, Nevada, Oak Ridge, Richland, San Francisco and the Bonneville Power Administration. Support was also provided to three non-DOE agencies: the Inter-American Foundation, the African Development Foundation, and the Occupational Safety and Health Review Commission.
- Managed, administered and coordinated the DOE hiring freeze which was in place from June 6, 1984, to May 6, 1985, and resulted in the lowering of on-board DOE employment to levels that ensured that FTE usage was below target in FY 1984 and in accordance with FY 1985 program levels.
- Processed over 900 rules, proposed rules and notices for publication in the Federal Register.
- An intensified effort was made by the Executive Secretariat to improve the time required by Departmental elements to respond to Congressional correspondence. As a result, congressional overdue correspondence was reduced by 30%.

- Rate intervention at the Federal Energy Regulatory Commission resulted in a $1.1 million refund to the Los Alamos National Laboratory.

- Developed a new In-house Energy Management Ten-Year Plan (FY 1986-1995) which established goals and programs to reduce energy consumption.

- All DOE Headquarters telephone sets, data sets (MODEMS), speakerphones, and miscellaneous station equipment were purchased that had been previously leased from C&P telephone. This will result in an annual savings of approximately $1.8 million.

- A competitive procurement to replace the existing tariffed CENTREX telephone service was awarded and an estimated cost avoidance of $33.6 million is expected over the next 10 years. The replacement Information Exchange (IX) System will process both voice and data communications, as well as provide AOSS systems interconnection.

- The DOE-wide Departmental Integrated Standardized Core Accounting System (DISCAS) was successfully implemented. Among the tasks completed were the implementation of DISCAS for Headquarters, and the installation of the Hewlett-Packard 3000/68 in support of the DISCAS project.

- Established a training center to accommodate microcomputer, word processing, and all other ADP training for Headquarters. Also, established an AOSS training program covering the full range of microcomputers software products supported at Headquarters. Over 3,300 students attended these courses in FY 1985.

- The Department has successfully negotiated pension language in contracts with most of the operating contractors to ensure excess assets upon termination of the contracts will revert to DOE after contract pension obligations are fulfilled.

- Developed criteria and implemented a schedule for Department-wide conversion of letter-of-credit financing to the Treasury Financial Communications System (involved decelerating the disbursement of $8 billion annually).

- Carried out a comprehensive review of the DOE management and operating contracts, as required by the Federal Acquisition Regulations. This resulted in the authorization of 46 such contracts.

- Established goals for the timely closeout of inactive contractual instruments. These efforts resulted in contract closeout of more than 6,500 instruments. These activities will have reduced the inventory of inactive contracts by over 2,000 instruments from the fiscal year beginning balance.

- Improved Small and Disadvantaged Business participation in DOE procurement and financial assistance awards. During FY 1984, we achieved $2.3 billion in the small business programs and $292 million in the minority business programs. These figures rose to $2.5 billion and $293 million, respectively, for FY 1985.

Major Program Objectives for FY 1987:

- Continue to evaluate activities that have been contracted out to the private sector to be certain they remain economically justifiable as well as to identify and evaluate functions currently performed by Federal employees to see if the private sector could handle more economically.

- Issue revised and/or new policy directives for employment related programs, financial management, etc. to enable DOE to comply with statutory and regulatory requirements.

- Evaluate Federal Employee Occupational Safety and Health programs required by Executive Order 12196, Section 1-201(g) and 29 CFR 1960, and conduct analytical industrial hygiene studies.

- Identify Departmentwide priority training needs and design, develop and deliver the most effective and efficient developmental activities to satisfy those needs. Also, incorporate state-of-the-art training methodologies into new program designs and ongoing programs, as appropriate, in order to ensure the delivery of most effective and cost-effective training possible.

- Develop and deliver supervisory and managerial development programs that meet specific, identified job-related needs and comply with the requirements of Title 5 CFR and the Federal Personnel Manual.

- Publish technical maintenance manuals to enhance capabilities in such areas as roofing, road, utilities, lighting and other maintenance areas.

- Automate the field input to the real property maintenance crosscut budget, the General Design Criteria review process for construction programs, and other related areas. This will not only improve quality of data but will result in more timely receipt of information at Headquarters.

- Further implement provisions of the Department's new Ten Year In-House Management Plan which calls for 10% reduction in energy consumption per square foot by 1995.

- Perform an estimated 40 independent cost estimates on major acquisitions.

- Continue the central review and approval processes for ADP and MIS developments.

- Reduce the growth of health care costs at contractor facilities.

- Continue the automation of labor intensive functions by the use of various ADP equipment. The development of automated systems for the preparation of computer generated solicitations, contractual instruments and purchase orders will reduce the time and manpower required to carry out the procurement process. This will assist the Department in maintaining a quality acquisition program with minimal increases in staffing levels during the out-years.

- Continue to conduct organization and management reviews of all DOE elements and evaluate organizational effectiveness.
- Continue other management initiatives in such areas as cash management, audit follow-up, debt collection, paperwork reduction, etc. These reviews help to eliminate duplication, minimize costs and serve to assure that DOE is in compliance with the Administration's policies.
- Continue to improve departmental manpower management through programs that enhance productivity of the work force. Also, enhance present systems and initiate new systems that provide improved quantification, reporting, analysis and application of workload and manpower data. MA will continue to serve as the focal point for these activities.
- Implement and maintain a uniform Departmental system for documenting approved mission and function statements.
- Increase capability to independently assess and validate all new and ongoing projects, $5 million and above, to support the Department's top-level decision-making process, including the annual Internal Review Budget.
- Develop standardized cadastral system to ensure that maps, real estate documents and permanent acquisition records are preserved to furnish information and to protect the legal and financial rights of the Government in accordance with Chapter 31 of Title 44, U.S.C., Records Management by Federal Agencies.
- Develop the capability to provide accurate long range forecasts of requirements for expense funded maintenance, General Plant Project and Capital Equipment replacement.
- Further develop the capability for electronic data transfer and networking of automated systems between field and Headquarters to improve the quality of the Department's project and in-house energy consumption data bases and timeliness of related periodic reports to management.
- Continue to implement criteria and procedures for improving cost and schedule control systems of the Department's management and operating contractors to enhance control and visibility of project performance.
- Continue to enhance the Departmental ADP and MIS Long-Range Plans and the management review program concept as a means to evaluate and improve DOE management of ADP resources.
- Continue the Department's program to carry out the provisions of the Competition-in-Contracting Act. This Act has new provisions concerning solicitation requirements, noncompetitive procurement execution and bid

protests. It also directed the establishment of Competition Advocates throughout the Department. The Act has fundamentally changed the way government contracting is carried out and considerable resources will be expended toward this effort in the future years.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
MANAGEMENT AND ADMINISTRATION
Departmental Administration - Operating Expenses
Departmental Administration - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Operating Expenses	$128,669	$129,042	$135,505	$139,459	$+3,954
Capital Equipment	3,309	8,953	8,953	6,688	-2,265
Program Subtotal	$131,978	$137,995	$144,458	$146,147	$+1,689
Less use of prior year unobligated balances	0	-10,455	0	0	0
Less use of prior year deobligations	-6,000	-6,000	-6,000	-6,000	0
Budget Authority	$125,978	$121,540	$138,458	$140,147	$+1,689
Staffing Total FTE's	1088	1117	1117	1117	0

Authorization: P.L. 95-91

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
MANAGEMENT AND ADMINISTRATION
(In thousands of dollars)

FY 1986 Adjusted Appropriation............................	$121,540
Use of prior year unobligated balances....................	+10,455
Use of prior year deobligations...........................	+6,000
Program Subtotal..	$137,995
Built-in increases and decreases:	
SLUC rate increase..	+6,463
FY 1987 Base..	$144,458
Program increases and decreases:	
Increase salaries and expenses to fully fund 1117 FTE's, increased average salaries, within grade increases, promotions and Relocation Income Tax allowance (legal requirement).................	$ +2,659
Increase Workmen's Compensation to cover additional costs of compensation and medical benefits incurred by Department of Labor for employees under DOE's jurisdiction....................................	$ + 445
Increase SES Rank and Performance Awards to cover new calculation methodology..	$ + 240
Increase travel to cover increased Departmentwide training activities and additional review and assessment of field program and policy implementation..	$ + 571
Increase to cover minor adjustments in contractual services...................................	$ + 39
Reduce capital equipment	$ -2,265
Less use of prior year deobligations.......................	$ -6,000
FY 1987 Budget Authority	$140,147

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION

Management and Administration

The major goals for Management and Administration are to provide adequate support to Departmental programs, identify and eliminate areas of waste, extravagance and costly administrative overhead, and at the same time promote increased efficiency and effectiveness in management and administrative support systems and services.

Management and Administration (MA) provides a wide range of institutional support services to the headquarters organizations and to the Department as a whole. Areas of support include management policies and procedures; personnel management; project and facilities management; administrative services; automatic data processing and communications; contractor industrial relations; financial management; procurement; coordination of correspondence; and equal opportunity activities. The funding request covers costs for salaries, benefits, travel and personnel support costs.

	FY 1986 Program Level	FY 1987 Request
Management and Administration	$137,995,000	$146,147,000

The FY 1987 Management and Administration request of $146,147,000 reflects a net increase of $8,152,000 over the FY 1986 Program Level. Use of $6,000,000 in prior year deobligations will be used to finance this program. This funding level will enable Management and Administration to continue to provide adequate support to the Department.

Salaries and Expenses	$ 45,830,000	$ 49,174,000

Includes estimates for full-time permanent base salaries; other compensation, which includes base salaries for other-than-full-time positions, reimbursement to other Government agencies for personnel loaned to the DOE, terminal leave, awards and overtime; and benefits which cover expenses to the Civil Service Retirement and Disability funds, Employees Health Benefits and Life Insurance funds, payments to the Employees Compensation Fund, moving expenses, and Workmen's Compensation. Also includes funding for SES rank awards and performance bonuses for the Department as set forth under the Civil Service Reform Act of 1978.

MA's request of $49,174,000 is $3,344,000 above the FY 1986 Program Level. This request will fully fund 1,117 FTE's, an increase in average salaries, within-grade increases, promotions, a new legal requirement regarding Relocation Income Tax Allowance, an increase in workmen's compensation payments and increased costs of SES Rank and Performance Awards which is necessary due to an OPM change in regulation.

Travel	$ 1,925,000	$ 2,496,000

Covers funding for official domestic and foreign travel of MA personnel, GSA motor pools, shuttle bus services to support Headquarters activities and travel to support Departmentwide training programs.

The request of $2,496,000 represents a $571,000 increase over the FY 1986 Program Level. Additional funds are needed to cover the increased support of Departmentwide training programs and the increased efforts in the review and assessment of field program and policy implementation in the areas of personnel policies, personnel management evaluation, independent cost estimating, real property and facilities management, financial management and compliance reviews of contract and assistance instruments.

Contractual Services and Supplies.............$ 81,287,000........$87,789,000

The request of $87,789,000 provides essential support services to Headquarters including transportation of things; SLUC; communications, utilities and other rent; printing and reproduction; other services such as ADP support, guard services, court reporting and equipment repair and maintenance; and supplies and materials.

This request reflects an increase of $6,502,000 which will cover the SLUC rate increase imposed by GSA and minor adjustments in other support services areas.

Capital Equipment.............................$ 8,953,000....... $ 6,688,000

Provides for replacement of ADP and administrative equipment which has become unserviceable or on which further repairs would be uneconomical. In addition, funds will provide for equipment to support office automation initiatives, communications requirements, the conversion of leased copiers to purchase and COMSEC/TEMPEST equipment.

This request represents a reduction of $2,265,000 from the FY 1986 Program Level. This decrease in funds is possible due to the intent to purchase needed computer equipment in FY 1986.

Staffing.......................................1117 FTE's...... 1117 FTE's

Management and Administration's diversity entails providing support to all Departmental elements for centralized policy direction of management activities, monitoring, and oversight functions, and provides a wide range of institutional support services to the Headquarters organizations and to the Department as a whole. We can provide the current level of management services and support at the requested level. Every effort has been made and we will continue to strive for greater efficiencies; in cooperation with the Administration's initiatives in reducing manpower in the Federal Government. Since 1981, Management and Administration has reduced manpower from the 1400's to our current level. Even though our responsibilities have increased, we have accomplished substantial organizational efficiencies to counteract these reductions. We are the leader in Government in our management of a Cabinet Department and have increased the number of small Federal agencies which we support on our personnel/payroll system; have taken the lead on several Reform 88 initiatives; and were the first Department in the Federal government to successfully implement an unclassified computer security program in accordance with OMB Circular A-71. We continue to focus attention on improving and streamlining our operations that affect our own internal activities, as well as those that impact other DOE organizations.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

OPERATIONS OFFICES

MAJOR ACTIVITIES OVERVIEW

- The five organizational elements responsible for the Department of Energy programs field execution, including energy technologies, defense, nuclear, basic and applied research and environmental programs are the Chicago Operations Office, Idaho Operations Office, Oak Ridge Operations Office, Richland Operations Office, and San Francisco Operations Office.

- The remaining operations offices, Albuquerque, Nevada and Savannah River, are funded by the Atomic Energy Defense Appropriation.

- The operations offices perform a wide variety of functions in support of energy activities throughout the country. Amoung these functions are field procurement, health and safety monitoring, property management, labor relations and maintenance of personnel and financial systems. Additionally, the operations offices plan, develop and administer budgets and maintain an administrative staff to support on-going programs and projects.

Chicago Operations Office

- Current Chicago Operations assignments include key elements of the advanced reactor base technology program, the salt and cyrstalline rock projects in the Civilian Nuclear Waste Management Program, magnetic confinement fusion R&D and test facility activities, magnetohydrodynamic projects and test facility activities, conservation and renewable energy technology projects, and monitoring of the Federal loan guarantee for the Great Plains Coal Gasification Projects.

- Laboratories and facilities operated or managed by the Chicago Operations Office include: (Multiprogram facilities), Argonne National Laboratory, Bates Linear Accelerator Facility, Fermi National Accelerator Laboratory, Michigan State University (MSU)/DOE Plant Research Laboratory, Notre Dame Radiation Laboratory, Princeton Plasma Physics Laboratory, Radiobiology Laboratory at the University of Utah, the Solar Energy Research Istitute, (Goverment operated), Environmental Measurements Laboratory, and the New Brunswick Laboratory.

Idaho Operations Office

- Current assignments of the Idaho Operations Office include chemical processing operations and demonstration; waste management operations and demonstrations; Nuclear reactor safety research development and demonstration; alternate energy technology development and demonstration; remedial action programs; and programs for state and local assistance.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

OPERATIONS OFFICES

Idaho Operations Office (con't.)

o In addition to carrying out its program responsibilities at the Idaho National Engineering Laboratory, the Idaho Operations Office also has jurisdiction over various programs at the following locations: Grand Junction (CO) Area Field Office; Denver (CO) Support Office; Butte (MT) MHD Project; TMI (PA) Site Office; and the West Valley (NY) Project Office.

Oak Ridge Operations Office

o The current Oak Ridge assignments are the production of nuclear weapons components in support of national defense programs; the production of enriched uranium for defense requirements and for fueling nuclear power plants in the United States and abroad; the processing of uranium feed materials and related production reactors; extensive energy research and development; and facility development and operations of Strategic Petroleum Reserve to reduce the nation's vulnerability to the effects of petroleum supply interruptions.

Richland Operations Office

o Currently, the Richland mission is accomplished primarily in government-owned facilities for the Department by eight integrated contractors. Effective October 1, 1987, the eight integrated contractors will be combined to include an operations and engineering, an architect-engineering/construction, and a research and development contractor with possibilities of a fourth contractor specifically for medical services. These consolidation efforts began early in FY 1985. Under the present arrangement, approximately 13,700 contractor employees perform the actual research and development, production, chemical processing, waste management, and site services. A relatively small staff of Federal employees, funded primarily through the Departmental Administration (WA) program, has the overall responsibility for general management and the direction of Department programs and activities. Included are safety and environmental protection, financial administration of funds, procurement and contract administration, safeguards and security, and appraisal of contractor performance.

San Francisco Operations Office

o The San Francisco assignment is to execute program and project activities in Defense, Nuclear Energy, Magnetic Fusion, Energy Research, Fossil and Conservation and Renewables Programs. The office manages several DOE GOCO laboratories, including Lawrence Livermore National Laboratory, Lawrence Berkeley Laboratory, Stanford Linear Accelerator Laboratory and the Energy Technology Engineering Center, and DOE Research Laboratories including laboratory of Biomedical and Environmental Sciences (UCLA), Laboratory of Energy-Related Health Research (UCD), Laboratory of Radiobiology (UCSF), and Stanford Synchrotron Radiation Laboratory (SSRL).

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
OPERATIONS OFFICES
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted	FY 1987 Base	FY 1987 Request	Request vs. Base
Operations Offices.....	$89,786	$88,848	$88,848	$94,222	$+5,374
Staffing Total, FTE's..	1,586	1,606	1,606	1,601	-5

Authorization: P.L. 95-91

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
OPERATIONS OFFICES
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

FY 1986	$88,848
Built-in increases and decreases	-0-
FY 1987 Base	$88,848
Program Increases and Decreases:	
- Increase from repricing of salaries and benefits	+3,167
- Increase for authorized travel away from official station, including local travel	+496
- Increase in requirements for Standard Level User Charges (SLUC), Communications, ADP Computer Services, supplies and materials, and printing and reproduction	+1,724
- Reduction in capital equipment	-13
Subtotal	$+5,374
FY 1987 Budget Request	$94,222

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION
OPERATIONS OFFICES
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

The five Operations Offices conduct research and development activities by applying engineering and scientific expertise to several aspects of the nuclear field; alternative energy applications, advanced energy systems, environmental and safety applications, programs supporting national security and defense programs. A general administration staff provides administrative and inter-program technical management of assigned program and projects.

A total of $94,222,000 is requested to enable the five Operations Offices to provide for personnel and related support cost to manage and execute headquarter-delegated program/projects responsibilities. The Budget can be categorized as follows:

	1986	1987
o Salaries and expenses...............	$63,700	$66,867
- Includes estimates for full-time permanent base salaries, other compensation, which includes base salaries for other than full-time positions, terminal leave, overtime, and benefits which cover expenses to the Civil Service Retirement and Disability. Employees Health Benefits and Life Insurance funds, payments to the Employees Compensation Fund, FICA taxes, moving expenses, and any benefits for former employees.		
o Travel.............................	$ 1,403	$ 1,899
- Covers funding for official domestic and foreign travel and minor amounts for GSA motor pools.		
o Contractual Services...............	$22,757	$24,481
- Provides for transportation of things; communications; rents and utilities; printing and reproduction; supplies, materials and other essential services necessary to support programmatic efforts for the Operations Offices. Also provides funding for the Oak Ridge Museum of Science and Energy.		
o Capital Equipment..................	$ 988	$ 975
- Provides for procurement of administrative equipment which has become unserviceable or on which further repairs would be uneconomical.		

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

OFFICE OF MINORITY ECONOMIC IMPACT

The goals of the MI program are to advise the Secretary of Energy on the impact of national energy policies, programs and regulations on minorities and minority business enterprises; to provide management and technical assistance to minority educational institutions and minority business enterprises to increase their level of participation in energy activities; and to provide loans to minority businesses to facilitate their participation in the procurement activities of the Department. The goals are in support of activities mandated by Section 641 of the National Energy Conservation Policy Act (Public Law 95-619, dated November 9, 1978).

In support of the goal to advise the Secretary of Energy on the impact of energy policies on minorities and minority business enterprises to attain certain Research objectives, MI will develop relevant comparative data, impact analyses, and other information on minorities. This will be facilitated through three specific tasks which will: (1) Incorporate national and regional economic, resiential, and transportation data into MI's data bank and improving the categories of minority representation of the information; update and enhance the Minority Energy Assessment Model (MEAM) to provide policy-sensitive impact assessments and related analysis; (2) Incorporate the data and analysis on minorities into assessments for legislative and regulatory actions of DOE and in the formulation of policy and programmatic options; (3) Perform market research, economic and business analysis and feasibility studies to identify and define economic opportunities in energy research, conservation, and development.

Specific Objectives and Expected Benefits to be Derived from 1987 to 1990 Formulated in Response to Public Law 95-619 will be:

I. Research

In the area of Data Development and Analysis the objective will be the improvement and expansion of the minority data bank and enhancement of the MEAM model in order to facilitate policy-sensitive impact assessments needed for the other research components of MI and for assessments of DOE's Office of Policy and relevant program offices. This will enable realistic assessments of the impact of energy policies and regulations on minorities as required by Section 211(c) of Public Law 95-619. The FY 1987 objective will be to update and improve the component models of the MEAM. The FY 1988, 1989, and 1990 program objectives will include: (1) Further improvements in the minority representation in the data bank by including some Hispanic and American Indian ethnic categories and enhancing the overall regional characteristics in the data; (2) updating some data and other information into the forecasting models to enhance the forecasting capabilities of the task; and (3) providing some special studies and analyses to interpret specific economic scenarios and other information in the data bank, and performing focused economic and technical assessments for related policy and progam efforts.

The benefits to be derived are that this systemmatic updating and improvements to the data bank and the MEAM will enable MI to better address its mandated responsibilities to assess the impact of energy policies and regulations on minorities. Furthermore, an improved and updated data bank and policy-sensitive model will provide relevant analytical capabilities to the policy and program offices, within the Department, which have recognized the fact that MI's unique minority data and analytical capabilities can augment their assessment efforts.

In the area of Policy Assessments, the objective will be to continue to provide the Secretary of Energy with timely and detailed assessments of how minorities are being and will be impacted by national energy policies, energy programs, and significant energy-related legislation and regulation; compared to other population categories. The activity will be a supplement to DOE's overall policy and evaluation efforts, with a specific focus on minorities, and will be in furtherance of Section 211(b) of Public Law 95-619. In FY 1987, the objective will be to continue to provide some focused information on minority energy consumption and use patterns and disposable income spent relative to other population categories and to incorporate the information and analysis internally to DOE's policy and program offices. This will enable those offices to reflect the impact of energy policies and programs on minorities, in their development of assessments of program regulations and for legislative and regulatory actions of DOE. In FY 1988, FY 1989 and FY 1990, the objective will be to (1) evaluate selected DOE program regulations which significantly impact minorities and develop relevant comments and recommendations, as appropriate; (2) focus on existing DOE legislation and legislative initiatives; (3) provide policy assessments and related analysis for major energy technology projects which may impact minorities.

The benefits to be derived include the evaluation of the distribution impacts of national energy policies, programs, legislation, and regulation on minorities as is mandated by Public Law 95-619. Such evaluation at the micro level, by applying in-depth analysis at the regional level and by socioeconomic categories, will enable detailed indicators of impacts which may deviate from generic studies in specific regions and for specific population categories and subcategories. Program activities can then be developed to mitigate any adverse impact of energy policy and program actions.

For Market Analysis - Research, the objective of this task will be to provide market research, planning economic and business analysis, and feasibility studies to identify and define economic opportunities for minorities in energy research, production, conservation, and development as is specified in Public Law 95-619(d)(2). This research activity will facilitate some of the technical assistance which MI provides to minority business enterprises and to organizations where the primary purpose is to assist the development of minority communities. The FY 1987 objective is to focus on market research and financial planning analysis which will indicate to minority businesses specific factors which are needed to achieve economic viability with selected energy technologies and provide technical information documents to assist them in their planning efforts as they assess the business potential of new energy technologies. For FY 1988, 1989 and 1990, the objectives will be to: (1) Develop projections on the development of markets within minority communities for specific energy technologies; (2) Develop market penetration models for selected new energy technologies, and (3) Determine relevant strategies to assist minority energy entrepreneurs to penetrate energy market segments.

The benefits to be derived from this task include the implementation of activities to satisfy the requirements mandated in Public Law 95-619(d)(2). Furthermore, the technical assistance which the development of the technical information will facilitate will enhance the opportunities for minority business enterprises in various sectors of the energy industry and increase their participation in energy supply, conservation, production, and other energy businesses. This task will also provide an adequate mechanism to educate and inform minority business enterprises and minority communities about DOE programs and related energy technology developments in the energy arena with the objective of increasing the level of minority participation.

This restructured Research Program concentrates on programs and actions which will be more responsive to the mandated responsibilities of MI. The major program emphasis is to continue the development of specific tasks which will provide regional and micro-level comparative data, impact analyses, and other information on minorities to other offices within DOE for program and policy impact assessments and legislative and regulatory actions such as rulemaking proceedings. In addition, the market analysis and projections task will provide concentrated technical assistance and other information to assist in the decision-making of minority business entrepreneurs and encourage the development of the minority market for goods and services in the technology segment of the energy industry.

II. Management and Technical Assistance

The objective of MI's country-wide Minority Honors Training Program in energy-related technologies will be to continue to provide scholarship funding to financially needy minority honor students. In addition, MI will continue to match-make the DOE funded New Mexico colleges with high technology industries for equipment donations, specialized training, cooperative training, full-time and summer employment in the budget year. This project furthers the requirements contained in Section 211(d) of Public Law 95-619.

The benefits to be derived will include MI funded scholarships to financially needy minority honor students that would not otherwise be given the opportunity of obtaining vocational training in energy-related fields. Likewise, MI's match-making efforts will provide these financially needy minority honor students with better job opportunities in energy-related industries, upon completion of their training and entry into the marketplace.

The objective of the FY 1987 Minority Educational Institution Assistance Program is to continue assistance to selected institutions based on a competitive procurement in FY 1986. Support will continue for development of science and technology research and development centers. The joint program with industry will continue to improve private sector interaction with these institutions. This project responds to the requirements contained in Section 211(d) of Public Law 95-619 and supports the goals contained in Executive Order 12320 of September 15, 1981.

The benefits to be derived from this program will be continued support to selected minority institutions thereby increasing their ability to compete for energy activities of the Department.

The primary objective of the Minority Economic Development Program is to advise the Secretary about the impact of energy activity on minority business enterprises and to develop ways to assure that minority business enterprises (MBE's) are afforded an opportunity to participate fully in the energy programs of DOE.

There are two distinguishing features of the Minority Economic Development Program, (1) it makes a concerted effort to seek out, encourage and provide technical assistance to small and large disadvantage businesses, and (2) it assists Departmental Officials in ways to increase the participation of disadvantaged business in DOE activities.

The FY 1987 funding includes resources to continue outreach, focused technical assistance and minority business energy enterprises development activity.

Through close interaction between MI, HQ and Operations Office officials, MI will focus efforts on the activity which has been identified as essential (1) to encouraging, developing, and providing technical assistance to MBE's as well as increasing MBEs in DOE contract activity, and (2) providing assistance and information to the DOE operations offices in their efforts to increase MBE participation. The benefit to be derived from these projects will be the increased participation of Minority Business Enterprises in DOE contracting activity which will result in greater economic benefit to minority businesses and in turn to the minority community at large.

The objectives of the Minority Energy Information Clearinghouse is to provide tailored information responses, development of data targeted for minority business enterprises, continuation of maintaining and disseminating information to anyone who needs to know about energy programs and the economic impact of those programs on the minority community. The benefits to be derived from the Minority Energy Information Clearinghouse will include assisting the participation of minority businesses in DOE procurement activities; compiling a body of minority energy-related information which will help in policy analysis, facilitating research into the subject area by centralizing available information.

III. Financial Assistance

The FY 1987 objective of the Financial Assistance Program will be to continue to provide bid or proposal preparation funding to minority-owned businesses seeking DOE work; to continue to implement relevant recommendations arising from the program evaluation study of the Financial Assistance Program performed in FY 1985; undertake further structural refinements to the program including selective development of improved forms and procedures and further review and analysis of particular areas highlighted in the evaluation study. The FY 1988, 1989 and 1990 objectives will remain unchanged from the 1987 objectives, subject to the possible changes stemming from the program evaluation study. Carryover funds from previous years will be utilized to continue providing financial assistance to minority-owned businesses.

The benefits to be derived from accomplishment of the proposed objectives include improvement in the ability of minority-owned businesses to do work for DOE, with attendant increase in economic activity for these firms, and the further development of energy-related capabilities by such companies.

The FY 1987 objective of the Minority Financial Institutions Development Program will be to continue to administer the Minority Financial Institutions Development Program, which includes minority banks and thrift institutions. DOE will increase deposit levels in minority thrifts to $500,000 per institution. Approximately $80 million in consent order funds will be on deposit in 160 minority financial institutions. The source of deposit funds are derived from DOE's Petroleum Violation Escrow funds which are non-appropriated funds.

The benefits to be derived from the above program include the continuation of loans and investments made by these financial institutions in minority communities, and the increase in interest earned on these deposits which eventually will be returned to the public.

Calendar Year 1986 Expected Accomplishments include:

I. Research

- To augment the data bank development, some limited regional-based information will be added from other sources of data information in order to improve the quality of the data, and also to facilitate relevant forecasting of residential and transportation energy demand.
- Development of a minority economic model and a transportation component to the MEAM will be implemented by incorporating relevant information from the Annual Housing Survey information base.
- The national and regional data will be improved and made more accurate by adjusting for discrepancies between the EIA "RECS data" and the Census data by applying the Iterative Proportional Fitting Technique to adjust individual expansion factors of weights for different parameters.
- The methodology of the Minority Energy Assessment Model (MEAM) will be modified to reflect compatibility with end-use equipment characteristics from the EIA Home Model.

- Three special studies on alternative economic growth and higher energy price will be formulated and the information shared with the DOE policy office and with relevant program offices so that analyses on the effects on minorities relative to other population categories can be conducted and specific indicators be assessed for inclusion in future programmatic considerations.
- Specific socio-economic and energy-use information will be developed from the data bank and provided to the policy office and to relevant program offices so that in-depth analysis at a more micro level can be facilitated by specific minority categories at the regional level.
- Information from MI's research efforts will be incorporated internally to reflect the impact of energy policies and programs on minorities in the development of assessments for legislative and regulatory actions of DOE and other federal agencies.
- A technical information document designed to assist minority businesses identify and define economic opportunities and financial options in various segments of the energy industry will be developed and disseminated.
- Market penetration estimates by regions and subgroups, for use by minority entrepreneurs to assess the market penetration potential of new energy technologies, will be developed.

II. Management and Technical Assistance

- Phase II or the operational phase of the Cooperative Developmental Energy Program with two minority educational institutions, minority businesses, and the energy industry participants will be phased down.
- Internship programs for faculty and students with the individual minority educational institutions and the energy industry cooperative parties will be continued and the scope extended.
- The implementation of specific energy industry-related courses at minority educational institutions will be emphasized.
- Comprehensive technical energy seminars, co-sponsored with the energy industry participants, for students and minority business enterprises will continue to be conducted at the individual educational institutions.
- Technical assistance will be provided to minority institutions identified as having the potential to conduct energy-related research.
- A competitive procurement for development of research centers and joint activities with industry will be issued.
- Will continue the country-wide minority honor projects in energy-related technologies to provide scholarship monies for tuition, books, tools, and laboratory fees to needy minority students.
- Will continue to compile data on placement of graduates in energy-related fields.
- Will continue match-making the DOE-funded New Mexico Colleges with high technology industries for specialized training, cooperative training, improving employment opportunities.

- Will provide technical assistance to 200 minority businesses, and with special focused activity for minority-owned women firms to enhance their capabilities, thereby improving their ability to compete for energy-related technical procurement opportunities. Top priority will be placed on the nationwide Disadvantaged Outreach Project to promote DOE programs and its interest in the minority community.

- Will continue to operate the Minority Energy Information Clearinghouse, providing requisite publicity regarding the existence and capabilities of this serivice. Focused activity will be initiated to determine the informational needs of minority business enterprises.

- Will increase the number of items in MI's Oak Ridge TIC/RECON computerized data base and other non-computerized data bases.

III. Financial Assistance

A. Financial Assistance Program

- Will evaluate recommendations arising from the program evaluation study of the Loan Program conducted during FY 1985.

- Will commence to implement the relevant recommendations contained in the aforementioned study.

- Will continue to provide loans and possibly other financial assistance to minority business enterprises.

B. Minority Financial Institutions Development Program

- Will continue to administer the Minority Financial Institutions Development Program, implementing the approved increase in deposit levels in minority banks from $400,000 to $500,000 per bank.

- Will seek approval to increase deposit levels in minority thrift institutions from $200,000 to $500,000 per institution.

- Approximately $60 million in consent order funds will be on deposit in 160 minority financial institutions. This effort will continue to be funded from DOE's Petroleum Violation Escrow Account, and not with MI appropriated funds.

- Will continue to provide for administrative support for the Minority Financial Institutions Development Progam.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
OFFICE OF MINORITY ECONOMIC IMPACT
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
RESEARCH					
Minority Energy Assessment Model - Data Development & Analysis	200	196	196	296	+100
Policy Assessments	300	221	221	295	+ 74
Market Analysis	-	172	172	174	+ 2
Regional Assessments	200	-	-	-	-
Forecasting	200	-	-	-	-
Subtotal	900	589	589	765	+176
MANAGEMENT & TECHNICAL ASSISTANCE					
Minority Honors Training Program	150	402	402	121	-281
Cooperative Development Energy Program	225	-	-	-	-
Minority Educational Institution Assistance	100	785	785	-	-785
Minority Energy Information Clearinghouse	200	172	172	124	- 48
DOE/Energy Industry Collaborative Project	150	-	-	-	-
Minority Business Enterprise	125	-	-	-	-
Minority Economic Development Program	-	118	118	190	+ 72
Subtotal	950	1,477 1/	1,477	435 3/	-1,042
FINANCIAL ASSISTANCE					
Minority Financial Institution Development Program	-	-	-	-	-
Subtotal	-	-	-	-	-
Program Direction					
Operating Expenses	558	530	530	589	+ 59
Subtotal	558	530	530	589	+ 59
Total	2,408	2,596 2/	2,596	1,789	- 807
Staffing Total FTEs	11	11	11	11	-

Authorization: Section 614, P. L. 95-619

1/ Includes $393,000 to be deferred to FY 1987.

2/ Reflects a general reduction of $153,000 and a Gramm-Rudman reduction of $106,000. Also reflects a 5 percent pay restoration of $27,000.

3/ Does not include $393,000 to be deferred from FY 1986.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
OFFICE OF MINORITY ECONOMIC IMPACT

(Tabular dollars in thousands. Narrative material in whole dollars)

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Minority Educational Institution Assistance	100	785	785	-	-785
Minority Energy Information Clearinghouse	200	172	172	124	- 48
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DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
OFFICE OF MINORITY ECONOMIC IMPACT
(In Thousands of Dollars)

FY 1986 Adjusted Appropriation	$2,596
Program increases and decreases:	
Research	
o Maintain and integrate updated information in the Minority Energy Assessment Model	+ 100
o Maintain and integrate various segments of the Research Program with more DOE program and policy offices, with other Federal agencies, and with the energy utilities industry and minority educational institutions	+ 74
o Maintain the level of the technical information on energy technology markets for minority businesses and communities	+ 2
Subtotal	+176
Management and Technical Assistance	
o Significantly reduce the Minority Honors Training Program to assist financially needy minority honors students in energy-related technologies at two-year colleges	- 281
o Utilize deferred funds from FY 86 for Minority Educational Institution Assistance	- 785
o Decrease the Minority Energy Information Clearinghouse activities	- 48
o Maintain the level of the Minority Economic Development Program	+ 72
Subtotal	-1,042
Financial Assistance	
o Loan Program*	- 0 -
Subtotal	
Program Direction	
o Provide operating expenses for staff of 11 FTEs	+ 59
Subtotal	+ 59
1987 Budget Request	1,789

*Funded from carryover funds

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION
OFFICE OF MINORITY ECONOMIC IMPACT (MI)

The FY 1987 Departmental request is for $1,789,000. This is a decrease of $807,000 from the adjusted FY 1986 appropriation. However, the FY 1986 and FY 1987 programs will generally be comparable based on our proposal to defer $393,000 of FY 1986 funds to FY 1987. This will provide for 11 full-time equivalent staff to further fulfill the statutory goals of the Office. In order to accomplish the goals and objectives of MI, which were stated in the introduction, the following program activities are included at the Departmental Request:

1. Public Law 95-619 mandates an on-going Research Program to determine the effects of national energy programs, policies and regulations on minorities.

   In FY 1987, the Data Development and Analysis segment of the research program will include analyses of survey data provided by the Energy Information Administration from their Residential Energy Consumption Survey data tapes and files, in addition to other relevant socioeconomic information from other national surveys. This is needed to facilitate realistic assessments of the impact of energy policies and regulations on minorities. It will be necessary to increase the representation of minorities, other than Blacks, in the data bank to facilitate more representative impact analyses with the Minority Energy Assessment Model (MEAM). However, it is necessary for the component minority economic model, residential energy model, and transportation energy model to be periodically updated in order for MI to facilitate relevant energy-policy impact assessments.

   Another research project will be Policy Assessments and related analysis. The major emphasis of this task will be to structure significant comparative data, impact analyses, and other information on minorities in a focused manner so that DOE's policy office and individual program offices can utilize the information for program and policy impact assessments and legislative and regulatory actions such as rulemaking proceedings. In this manner, MI's policy assessments and related analyses will provide DOE with a unique tool with which it can respond to the results of generic studies based on national averages. This coordinated working relationship with the policy and program offices was implemented in FY 1986.

   The Market Analysis - Research implemented in FY 1985 and 1986 so that MI can become responsive to its responsibilities which are specified in Public Law 95-619(d)(2) and which have not been previously addressed. The project focuses on linkages between energy technologies and minority business enterprises and employment opportunities, by developing appropriate technical information which will be structured to provide technical assistance to minority business enterprises and to minority communities in their decision-making. Some technical information will be researched and developed for this research task.

2. The Congressional Budget Request for Management and Technical Assistance programs will have the following impact:

   A. The Minority Educational Institution Assistance Program initiated in FY 1986 will support a comprehensive set of activities that will develop centers at minority institutions for energy research and development. These centers will draw on individual, unique capabilities of principal investigators and students at other minority institutions within their geographical area. The centers will provide an administrative and technical infrastructure vital to support competitive energy research at minority institutions. Also they will serve as a point of contact to coordinate technical assistance provided to minority educational institutions by other federal organizations.

In addition, the programs will solicit joint projects between minority educational institutions and the private energy industry sector designed to expand the relationships between the institutions and industry. This effort will also be designed to strengthen the academic offerings at the minority institutions through visiting professorships, loan of personnel and joint assignment between the minority institutions and the private and public sector energy industry, and the implementation of energy curriculum at the educational institutions.

B. The Minority Economic Development Program. At this level of funding, MI will continue data collection to be used to advise the Secretary in an effort to assure that minority business enterprises are afforded an opportunity to participate fully in the energy programs of DOE. Focused technical assistance will be provided to minority businesses. In addition, assistance and information to the DOE operations office in their efforts to increase MBE participation in DOE field-sponsored activities will be provided.

C. Two of the nine colleges in the present Minority Honors Training Program for financially needy minority honor students will be funded. The country-wide Minority Honors Training Program in energy-related technologies provides scholarships for tuition, books, tools and laboratory fees to financially needy Black Americans, Hispanic and Puerto Rican Americans, Native American Indians, Asian Americans and Native Alaskan honor students.

D. The Minority Energy Information Clearinghouse will continue to be operational. Funding at this level will provide for dissemination of information and publicity of available services.

E. The Minority Financial Institution Development Program assistance will continue to be provided in the form of short-term deposits in minority-owned financial institutions. Under DOE's Minority Financial Institutions Development Program, non-appropriated funds obtained through consent decrees with major energy companies are deposited in short-term Certificates of Deposit in minority financial institutions, which use the funds to make loans and investments in minority communities. Approximately 160 minority financial institutions are eligible to participate in this project.

Funding in the amount of $589,000 will cover operating expenses for 11 full-time equivalent staff positions, which are needed to support this program which has diverse program areas requiring varying kinds of technical expertise.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

OFFICE OF POLICY, PLANNING, AND ANALYSIS

The Office of Policy, Planning and Analysis (PPA) is part of the Office of the Secretary. PPA is the principal staff advisor to the Secretary and Deputy Secretary for formulating and recommending national energy policy and carries out analyses of DOE programs to ensure each contributes the maximum to national energy policy. PPA provides the Secretary and Deputy Secretary with an objective policy analysis and evaluation capability, coordinates energy-related policy analysis conducted within the Department of Energy and the Executive Branch, provides policy analysis and economic analysis support to the DOE Program Assistant Secretaries, and carries out studies mandated by Congress.

The policy framework within which PPA discharges its responsibilities is part of the Administration's overall policy calling for less spending, less taxes, and elimination of counterproductive regulations. That policy is described in the National Energy Policy Plan (NEPP). As described in the NEPP, the goal for all of the Department's energy policy actions is to foster an adequate supply of energy at reasonable cost. PPA's analytic, advisory, and coordinating activities are undertaken in support of this goal and are designed to assure that DOE activities are consistent with the energy policy strategies set forth in the National Energy Policy Plan; namely, to minimize federal involvement in energy markets while maintaining public health and safety environmental quality and to promote a balanced and mixed energy resource system.

Accomplishments for FY 1985 include:

Energy Market Issues

Developed tax analysis models and analyzed impacts of Treasury's November 1984 Tax Reform Proposal on energy industries.

Analyzed provisions of the President's Tax Reform Proposal (Treasury II) and prepared final analysis of the oil and gas effects of the President's package for use by DOE and Administration officials.

Prepared extensive analysis of the effects of the Strategic Petroleum Reserve moratorium.

Completed the second report required by Section 123 of the Natural Gas Policy Act of 1978.

Prepared DOE's comments on FERC's Notice of Inquiry on interstate transportation of gas and on FERC's Notice of Inquiry on natural gas pipeline ratemaking, risk, and financial implications after partial decontrol.

Completed Phase I of study on "Emerging Policy Issues in PURPA Implementation" and study on "Economic Analysis of Electricity 'Rate Shock'.

Completed initial analysis of effects of partial deregulation of railroads on coal transportation costs and electric utility prices.

Analyzed the Department of Commerce's Coal Import Study.

Completed detailed analysis of automotive fuel economy issues -- technical and economical.

Prepared detailed analysis of energy use trends from 1972 to 1984 including disaggregation of the components of the changes in the four end-use sectors of the economy. Results presented in national and international forums.

Completed a study of the economy's response (in terms of energy use and efficiency) to economic growth and changing energy prices.

Completed a multi-year project with the National Academy of Science on behavorial aspects of energy consumption. The results of the project are being used to develop new forecasting approaches to understand better energy end-use market responses.

Initiated an analytical effort to project the likely fuel shares (focusing on oil and electricity) in the residential and industrial sectors for the period 1985 - 1995.

International Energy Issues

Prepared energy projections portion of the U.S. submission to the International Energy Agency Standing Group on Long-Term Cooperation (IEA/SLT).

Environmental Issues

Prepared report analyzing the costs and benefits of alternative "acid rain" control strategies.

Analyzed the current economic potential for electric utility coal conversions, which included the impact of alternative "acid rain" control strategies.

Energy policy, planning, and support activities to satisfy DOE management objectives and Congressional mandates

Prepared the energy projections appendix for NEPP-V, providing a set of long-term projections (through the year 2010) of international and domestic energy production, consumption, and prices.

Prepared and submitted to Congress the biennial report on Energy Targets as required by Title III of the Energy Security Act.

Energy Technology

Completed study assessing the market potentials of ten new electricity-saving technologies.

Completed study assessing the economics of selected first-generation commercial nuclear power plants.

Analyzed effects of Federal regulations on utility decisions to cancel partially built nuclear power plants.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE

OFFICE OF POLICY, PLANNING AND ANALYSIS

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request Versus Base
Support Funding	$4,500	$4,243	$4,243	$4,500	+257
Program Direction	2,541[1]	3,205[2]	3,205	3,355	+150
Total Operating Expenses	$7,041	$7,448	$7,448	$7,855	+407
Staffing/Total FTE's	61[1]	64[2]	64	64	

Authorization: Sec. 102, 203, 657, 801, P.L. 95-91

[1] Reflects comparability transfer of $326,000 (7 FTEs) from Energy Supply R&D appropriation, Policy and Management, Office of Environment, Safety and Health to the Office of Policy, Planning and Analysis due to program structure change in FY85.

[2] Reflects real transfer of $287,000 (6 FTEs) from Energy Supply R&D appropriation, Policy and Management, Office of Environment, Safety and Health to the Office of Policy, Planning and Analysis due to program structure change in FY85.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF CHANGES
OFFICE OF POLICY, PLANNING AND ANALYSIS
(Tabular dollars in thousands/narrative material in whole dollars)

FY 86 Adjusted Appropriation	\$7,448[1/]
o Support Funding	257
o Program Direction	150
FY 87 Departmental Request	\$7,855

[1/] Includes real transfer of \$287,000 from Energy Supply R&D appropriation, Policy and Management, Office of Environment, Safety and Health to the Office of Policy, Planning and Analysis due to program structure change in FY 85.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION
OFFICE OF POLICY, PLANNING, AND ANALYSIS

The Office of Policy, Planning and Analysis (PPA), which is part of the Office of the Secretary, is the principal staff advisor to the Secretary and Deputy Secretary in the review of existing and prospective energy policies (including recommending new policy initiatives) and provides policy analysis support to DOE Program Assistant Secretaries. PPA oversees the analysis of policy issues, development of policy proposals, coordination of these initiatives within the Department and the Executive Branch, and the implementation of resulting policy decisions within Departmental programs. The Office concentrates upon strategic planning issues, analysis of the impacts of potential policy options and analytical efforts required for policy development. The policy framework within which PPA discharges its responsibilities is the National Energy Policy Plan (NEPP). As described in the NEPP, the goal for all of the Department's energy policy actions is to foster an adequate supply of energy at reasonable costs. PPA's analytic, advisory and coordinating activities are undertaken in support of this goal and are designed to assure that DOE activities are consistent with the energy policy strategies set forth in the National Energy Policy Plan; namely, to minimize federal involvement in energy markets while maintaining public health and safety and environmental quality and to promote a balanced and mixed energy resource system. There are no significant changes in PPA's FY87 budget request. In essence the request is to continue FY86 activities.

Achievement of the above, as well as achievement of the goals and objectives outlined in the overview are accomplished through several categories of activities:

- o Early and accurate identification of major energy policy issues that need to be addressed through long-term studies and analyses;
- o Continued development, analyses and evaluation of specific policies and programs, both in response to Congressional and Presidential mandates, and in fulfillment of more general responsibilities of the Office and the Secretary;
- o A program of fundamental, long-term studies of the nature, causes and potential solutions of the Nation's energy problems, designed to lead to improved insights and to form the basis for innovation and improvement in the Nation's energy policies and programs.

FY 1987 Budget Request

The FY 1987 budget request for PPA is $7,855,000, an increase of $407,000 from the FY86 adjusted appropriation. This budget request reflects a continuation of PPA's ability to perform specific functions in areas critical to the continued implementation of Administration energy policy and fulfillment of Congressional mandates and of PPA's ability to provide acceptable levels of policy analysis and evaluation support to the Secretary, the Congress and the President.

Policy Analysis and Systems Studies

The FY 1987 budget request for policy analysis and systems studies is $4,500,000.

This request will continue the high quality level of both short- and long-term studies and analyses of a limited set of major policy issues. Results from these studies are critical to the development of energy policy.

A broad range of both short- and long-term studies and analyses will be conducted in FY 1987. These studies will provide objective, independent data and analyses relating to current energy issues. The short-term analytical requirements mandated by the Congress, the President and the Secretary will continue to receive the highest priority in the allocation of PPA's resources. In addition to short- and long-term studies, efforts will be directed toward continuous monitoring, analyzing and forecasting the Nation's energy markets and the effects of new policy on these markets.

General activities to be pursued in FY 1987 include: economic analysis; energy supply and demand projections; analysis and review of policy recommendations; Congressional-mandated reports and studies; and special projects for the Secretary and Deputy Secretary.

Representative studies and analytical work planned in these areas for 1987 include:

Review and update energy trends analysis.

Complete development and application of new detailed energy demand forecasting model for residential/commercial sectors.

Complete analysis of the developing methanol fuel market for transportation (combined project with EPA).

Complete the Alaskan Export Study and the Refinery Policy Study.

Prepare DOE comments on FERC's Notice of Proposed Rulemaking on the Regulation of Natural Gas Pipelines after Partial Wellhead Decontrol.

Develop a fuel-specific end-use detailed model of energy use in developing nations as a function of their stage of economic development.

Complete analysis of end use sector responses to electricity supply contraints.

Update estimates of regional and national electricity supply requirements, under alternative levels of demand growth.

Analyze alternative approaches to tax reform in the electric utility industry.

Monitor and project factors affecting relationship between authorized and earned rates of return on electric utility investments.

Analyze comparative economics of alternative means of meeting future electricity demand.

Study the status and prospects for world coal trade, with emphasis on U.S. production.

Analyze the impacts of "acid rain" legislation proposals on U.S. coal production, transportation, and utilization.

Analyze trends and costs of coal transportation in U.S. and world markets.

Program Direction

The FY 1987 request for program direction is $3,355,000, an increase of $150,000 from the FY 1986 adjusted appropriation. This funding request provides salaries, benefits and travel expenses for 64 FTEs, and represents no increase in FTEs from FY 1986.

This budget request corresponds to the responsibilities of PPA under its mission statement and provides manpower resources to perform its specific functions in areas critical to the continued implementation of Administration energy policy and fulfillment of Congressional mandates and to provide acceptable levels of policy analysis and evaluation support to the Secretary, the Congress and the President.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

CONGRESSIONAL, INTERGOVERNMENTAL AND PUBLIC AFFAIRS

The Office of Congressional, Intergovernmental and Public Affairs (CP) is responsible for developing, managing and ensuring coordination of Departmental relations with the Congress; news media; state, local, territorial, and tribal government officials; other Federal agencies; and consumer, citizen, labor and business organizations; non-profit education organizations; energy-oriented groups; and the general public. This Office is also responsible for fostering and assuring competition among parties engaged in the supply of energy and fuels. In FY 1987, CP will continue efforts to present the President's programs for achieving an adequate supply of energy at reasonable costs for all consumers.

FY 1986 accomplishments will include:

- o Presenting and advocating the Administration's position on energy-related legislative matters--such as possible deregulation of natural gas, nuclear licensing reform, nuclear waste, safeguards and security at nuclear facilities, energy emergencies, energy taxes, uranium enrichment enterprise decision, U.S.-China Agreement, synfuels, environmental initiatives and clean coal--and participating in the development of new and revised legislation.
- o Coordinating Congressional appearances for over 300 witnesses in more than 150 hearings, and attending hearings, markups, briefings and Floor action.
- o Responding to Congressional requests for information and service, and coordinating all written communications with the Congress.
- o Coordinating and initiating activities in support of Departmental energy programs to advocate goals and strategies with Federal, state and local governments and other constituencies.
- o Identifying energy problems affecting Federal, state and local governments or other constituencies.
- o Representing the Department on the Energy and Aging Consortium, a private/public sector coalition, to network and deal with energy problems of the elderly.
- o Providing consumer responses to over 1,000 general letters, approximately 300 requests needing specific, individualized information or assistance, and over 10,000 telephone inquiries.
- o Providing the consumer constituency with material regarding current energy programs, activities, and policies for further distribution through their publications and other means.
- o Producing a bi-monthly news column--for over 3,800 daily and weekly newspapers across the country--to convey important energy-related information to consumers and generate feedback regarding viewpoints and concerns of consumers.
- o Arranging and/or participating in over 200 meetings with representatives of consumer organizations to discuss energy issues of interest and viewpoints; apprise appropriate DOE officials of feedback or early warnings concerning developments in their program areas of responsibility.

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- Preparing over 150 reports and background information on consumer organizations active in the energy area.

- Preparing weekly reports to White House and senior Departmental officials on current and upcoming internal and external consumer and intergovernmental issues and activities.

- Consulting with state, local, Indian, and territorial governments; the business and labor communities; and national organizations representing these officials on Departmental initiatives, issues, policy actions, and programs which affect them, and working toward the resolution of outstanding problems.

- Directing Departmental compliance with Executive Order 12372, "Intergovernmental Review of Federal Programs."

- Preparing over 300 reports on a regular basis, 200 special issue and early warning analyses, and weekly reports and updates of state energy legislation to keep senior Department and Administrtation officials, program, policy, and field offices informed of the energy-related policies, issues, concerns, and legislation of above constituency groups.

- Representing the Administration's energy policies and positions at over 30 National conferences and approximately 250 meetings involving state, local, Indian, and territorial governments, and the organizations that represent them.

- Promoting the prudent development of Indian energy resources through an interagency contract managed by CP with the Council of Energy Resource Tribes.

- Managing the Department's Micronesian status negotiations activities and policy assistance for the President's representative in the negotiation and approval process.

- Arranging more than 300 briefings, press conferences, editorial boards, interviews, etc., with news media for the Secretary and senior Department officials. Responding to approximately 150 telephone inquiries daily from print and electronic media, Congress, government agencies and the public.

- Preparing and/or reviewing, editing, clearing and issuing approximately 1,000 press releases, notes to editors, fact sheets, speeches, transcripts, Congressional testimony, press guidance and responses to inquiries.

- Providing daily liaison with the White House Press Office and frequent consultation with the White House Press Secretary and Public Affairs Office.

- Participating in emergency exercises sponsored by the Department and/or other agencies.

- Maintaining a balanced public information program for the Department through coordination of program office information activities and guidance to field and contractor public information officers.

- Producing DOE newsclips for daily and weekly distribution to Department officials in policy-making positions, Members of Congress, and selected White House staff.

- Receiving approximately 8,000 written inquiries, 9,000 phone inquiries, and approximately 8,400 walk-in requests for energy information.

- Preparing about 120 articles, letters to the editor, speeches, and talking points for senior Department officials.

- Responding to about 350 speaking invitations, assisting in the preparation of over 150 briefing books and papers for speaking engagements accepted by the Secretary, and preparing over 100 biographies on DOE officials.

- Managing Departmental publications program (including contractors and grantees) by reviewing content, inventory, distribution, costs, etc., in over 300 requests.

- Providing management and control throughout the Department of all audiovisual productions and exhibits developed and/or used for the dissemination of information, including reviewing over 250 requests.

- Publishing monthly Departmental newspaper, DOE This Month.

- Providing lead role regarding economic and legal analysis for DOE's participation in oil pipeline deregulation and in maintaining a deregulated gasoline marketing industry.

- Preparing competitive analyses on legislation affecting gasoline marketing, market approaches to energy disruptions, patent policy, and the effects of rail deregulation on coal transportation.

- Conducting in-house education seminars to apprise senior policymakers on how to use competition analysis in day-to-day policy development.

Specific objectives for FY 1987, formulated in response to Public Laws, are:

- Provide a continuing liaison between the Department and the Congress, and coordinate activities related to the consideration and passage of new and revised energy legislation.

- Continue efforts to establish and maintain effective two-way communications on energy activities between the Department and its constitutents in order to promote the development of national energy policies and programs that will achieve an adequate supply of energy at reasonable costs for all consumers, and strengthen the nation's economy and security.

- Examine the effects of Federal energy policies and regulations on state and local governments and on consumers.

- Continue to work with the news media and with energy officials toward a balanced public affairs information program.

Accomplishment of these specific objectives will help formulate new or revised Public Laws, and meet the objectives of pertinent existing Public Laws; assure clarity and consistency in information disseminated about energy programs; provide the public with opportunities for participation in energy policy decisionmaking; and reinforce the Administration's position that market-based solutions are the best allocators of scarce energy resources.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
CONGRESSIONAL, INTERGOVERNMENTAL AND PUBLIC AFFAIRS
DEPARTMENTAL ADMINISTRATION - OPERATING EXPENSES

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Congressional, Intergovernmental and Public Affairs (CP)					
Program direction.....	$ 3,368	$ 4,240	$ 4,240	$ 4,409	$ + 169
Public affairs	100	415	415	206	- 209
Consumer affairs	100	76	76	50	- 26
Competition	100	96	96	50	- 46
Indian affairs	500	289	289	200	- 89
Total Congressional, Intergovernmental and Public Affairs	$ 4,168	$ 5,116	$ 5,116	$ 4,915	$ - 201
Staffing Total FTE's - Direct*	91	88	88	88	---

Authorization: Sections 102, 103, 203, 301, 655 and 801 - P.L. 95-91
Section 604 - P.L. 96-597

* Excludes 2 FTE's included in the Civilian Radioactive Waste Management Office budget.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
DEPARTMENTAL ADMINISTRATION
(In thousands of dollars)

FY 1986 Appropriation enacted	$ 5,116
Built-in increases and decreases	---
FY 1987 base	$ 5,116
Program increases and decreases:	
Program direction	
o Provide additional funding for 88 FTE's	+ 169
Public affairs	
o Reduce contract support for evaluations and other public affairs activities	- 209
Consumer affairs	
o Reduce contract funding for radio spots and newspaper articles	- 26
Competition	
o Reduce contractor analysis, processing services, etc.	- 46
Indian affairs	
o Provide DOE share of interagency support for development of Indian energy resources	- 89
FY 1987 budget request	$ 4,915

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION
CONGRESSIONAL, INTERGOVERNMENTAL AND PUBLIC AFFAIRS

The Office of Congressional, Intergovernmental and Public Affairs (CP) manages and ensures coordination of relations with the Congress, news media, and other constituent groups. CP supports energy program offices and provides policy and guidance to ensure consistency in program activities with these groups. In addition, CP staff works closely with the field activities on intergovernmental and public affairs issues as well as dealing with the news media. They also provide oversight on relations between the Department and all external groups and entities (excluding international) and on immediate or potential energy-related issues arising from or affecting these groups.

The FY 1987 budget request is $4,915,000, a decrease of $201,000 from FY 1986. This amount will fund 88 FTE's, the same level as FY 1986. It will also provide reduced contractual support for public/press, consumer, competition and Indian activities.

Program direction

The request of 88 FTE's provides for staff in the Congressional affairs area to provide counsel and advice to all Secretarial officers and their staffs on relationships with Congress and to prepare briefing materials, legislative status reports and talking points for senior Department officials. It also provides for manpower necessary to support DOE witnesses in their appearances before Congressional committees in hearings, and to help assure prompt, complete responses to Congressional inquiries and requests.

This level provides staffing for the new Office of Communications established in FY 1985. This Office manages and oversees the overall public affairs and public information activities of the Department, and also provides overall policy guidance and management oversight for intergovernmental and consumer affairs, and for the competition function.

Staffing for press and public affairs provides the capability to assure clarity and consistency in energy information dissemination to the national news media and to the general public, and to maintain daily liaison with the print and broadcast media. Coordination of media activities both in Headquarters and with the field offices is supported. This level provides staffing to give an editorial writing capability; and to manage a publications and audiovisuals/exhibits program, and public inquiries activities.

Staffing for the Division of Domestic Affairs to carry out the intergovernmental affairs function provides for a central point of contact between the Department and state, local, tribal and territorial governments, and other Federal agencies.

Support is provided to examine the impacts of energy policies upon other levels of government and to work closely with these groups. Also, briefing papers on state energy issues are prepared for the Secretary and other Department principals. Staffing for the consumer affairs function provides a focal point for policy and oversight, and information coordination on behalf of consumers. In addition, this level provides for the evaluation of policy initiatives within DOE to determine their impact on competition in the energy industry.

This level also provides for a newly established Office of Public Liaison. It is responsible for support and assistance to the Secretary in working closely with energy-oriented associations, businesses and industries to keep them apprised of energy policies and programs. (The function of working with businesses and industries was previously assigned to the immediate Office of the Secretary.) Public Liaison also responds to speaking invitations and schedules speakers before national organizations.

Program support

A total of $506,000 is requested for CP program support in FY 1987. This includes $206,000 for public affairs, approximately $126,000 of which will be required for Press Services. This group is the central news media office for the Department through which all Headquarters materials intended for the news media flow. Press Services also provides guidance and coordination of news media materials prepared for and distributed by DOE field offices and facilities; maintains files of materials released; responds to media inquiries; and keeps the Secretary and other senior DOE staff informed about news media activities. Contractor support will be needed to assist this office to perform its assigned responsibilities including on-site assistance; monitoring and transcription of radio and television energy broadcasts; and wire dissemination of press releases to major news media. The $80,000 balance of the public affairs request will be needed to evaluate audiovisual products and publications throughout the Department and by contractors, as required by OMB Circulars A-114 and A-3.

For the Division of Consumer Affairs, $50,000 is requested to carry out its Congressional mandate to represent within the Department, consumer concerns and viewpoints, and convey on a national level important information in support of the Secretary and the Administration's energy policy. Consumer Affairs has discovered two low-cost, effective methods to assist in meeting this mandate. With the funds requested, the Office will be able to participate in a cooperative effort through which it will obtain five minutes per week of national radio air time to use for the above stated purposes. The funds will also provide for the printing, distribution and clipping service of a bi-monthly consumer news column disseminated to approximately 4,000 weekly and daily news-papers throughout the country.

Funding of $50,000 is also requested for the Division of Competition, which is responsible for evaluating the structure, conduct and performance of the energy industry and developing affirmative policies to enhance competition. Support funds are needed to provide for contractor analysis of energy issues, data purchases, and processing services.

Lastly, $200,000 is requested for Indian affairs to continue a contract with the Council of Energy Resource Tribes to promote the development of Indian energy resources. Under this DOE-administered, multiagency-funded contract, projects are undertaken which range from resource assessments, impact analyses and marketing studies to the provision of technical assistance to member tribes. The requested level will continue planned financial support as the tribes become more self sufficient.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

INTERNATIONAL AFFAIRS

The overall policy role for the Office of International Affairs is established by the Department of Energy Organization Act of 1977 (P.L. 95-91), and responsibilities assigned under the Atomic Energy Act of 1954 and the Nuclear Nonproliferation Act of 1978. These acts require the Department to develop and implement international energy policy consistent with domestic energy and U.S. foreign policy and to provide independent technical advice to the President on international energy related matters. Our primary international energy goals are to promote the energy policy interests and concerns in international fora and in bilateral negotiations; to advocate policies to remove impediments that hinder free international markets; to strengthen U.S. knowledge of developments and emerging issues in world energy markets, primarily nuclear, oil, coal and gas; to help shape policies that reduce the vulnerability of the United States and allied and other friendly countries to energy supply disruptions, predominantly oil and gas; and to enhance the effectiveness of energy R&D cooperation with other nations. Our areas of responsibility include international nuclear cooperation and nonproliferation matters covered under the Atomic Energy Act and the Nuclear Nonproliferation Act, international energy policy analysis and international cooperative arrangements with foreign nations and international energy organizations. Our activities are carried out primarily by our in-house civil service staff, supplemented, as needed, by energy experts in the private sector, universities, national laboratories, and other government agencies.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
INTERNATIONAL AFFAIRS
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
International Affairs (IA)					
International Policy Studies					
Operating Expenses	$1,250	$ 963	$ 963	$1,700	$+737
Subtotal	$1,250	$ 963	$ 963	$1,700	$+737
Program Direction					
Operating Expenses	$2,988	$2,976	$3,151	$3,380	$+229
Subtotal	$2,988	$2,976	$3,151	$3,380	$+229
Total					
Operating Expenses	$4,238	$3,939	$4,114	$5,080	$+966
Staffing Total FTE's	51	51	51	51	0

Authorization: P.L. 95-91

SUMMARY OF CHANGES
International Affairs
Departmental Administration - Operating Expenses

FY 1986 Appropriation	$3,939
Built in increases and decreases:	
° Withingrade and merit pay increases	+ 75
° Increased administrative support for overseas reps	+ 100
FY 1987 Base	$4,114
Programmatic increases and decreases:	
° Increase for full support of 51 FTE's	+ 110
° Increase in international policy studies	+ 737
° Increase support of IAEA program	+ 119
FY 1987 budget request	$5,080

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION

INTERNATIONAL AFFAIRS

Mission

The Department of Energy Organization Act of 1977 (P.L. 95-91) establishes the overall policy role for the Office of International Affairs. This Act requests the Department to develop and implement international energy policy consistent with domestic energy and U.S. foreign policy and to provide independent technical advice to the President on international energy-related matters. This general mandate is based upon the importance of international influences on the domestic energy program and the importance of energy as a component of foreign policy. International Affairs discharges this mandate in close cooperation with other offices of the Department, as well as the Departments of State, Defense, Commerce, Treasury and other concerned Executive Branch agencies such as the Nuclear Regulatory Commission.

The Office of International Affairs also carries out specific international responsibilities and commitments set by other legislation, including the areas of international nuclear cooperation and nonproliferation, natural gas/LNG imports, and international energy market analysis. International Affairs also administers a variety of important international arrangements, such as cooperative technology agreements with foreign nations and international energy related organizations, and it develops for and provides to the Department its international R&D policy, subject to approval by the Secretary. These agreements represent important U.S. Government commitments and many of them support broader U.S. political and economic objectives.

The Office of International Affairs is responsible for: developing international energy policy, including the international component of overall energy policy; developing, managing, and directing programs and activities that implement and support international energy policy and U.S. foreign policy; analyzing, assessing and monitoring world energy markets and trade, price and supply trends, and technological developments; developing Department positions for international negotiations; developing, negotiating, implementing and assessing U.S. international nuclear policies, including nonproliferation policies; maintaining relationships with foreign governments and energy organizations; supporting international energy organizations; developing, negotiating and administering a program of technical exchanges with foreign governments; and maintaining cognizance of the energy R&D policies and programs of foreign governments.

FY 1985 accomplishments include:

- Represented the United States at the International Energy Agency (IEA) in achieving an agreement by IEA Ministers on a common approach toward such issues as gas security and oil product imports.

- Provided an analytical base for policy decisions by closely following the international energy supply policies of major oil producers and consuming governments and international oil markets, including spot markets, pricing trends, patterns of sale, and movement of crude oil.

- Continued close working relationships and technical oil market information exchanges with key consuming and producing nations.
- Provided technical support for successful conclusion of Agreements for Cooperation for Civil Uses of Atomic Energy with China and Finland that will allow the export of U.S. material, equipment components and U.S. reactor technology.
- Consulted with foreign governments in establishment of new administrative arrangements required under Agreements for Nuclear Cooperation and initiated new procedures.
- Completed the review and action of over 150 "subsequent arrangements" for the transfer of nuclear material while improving the control mechanism.
- Coordinated processing, clearance and approval of major subsequent arrangements involving retransfer of 200 kg of Swiss-owned, U.S.-origin, plutonium, and which was first of its type outside of Japan and EURATOM.
- Continued progress on the renegotiation of Agreements for Nuclear Cooperation with Japan and EURATOM as directed by the 1978 Nuclear Nonproliferation Act (NNPA).
- Participated in all preparatory components for the Nuclear Nonproliferation Treaty (NPT) Review Conference in September 1985.
- Further developed a foreign travel tracking program to meet demands from the offices of the Secretary and other senior Headquarters officials, in addition to meeting external demands, for accurate information on current and projected travel.
- In cooperation with the Department of Commerce, laid the groundwork for the President's decision on June 14, 1985 to remove restrictions on crude oil exports to Canada. This action was taken in response to a similar decision by Canada to deregulate crude exports to the U.S.
- Conducted a review of the prospects for removing restrictions on the export of Alaskan Cook Inlet crude oil to the Far East. This action would involve the export of up to 30,000 barrels per day of crude.
- Advanced policy of greater international use of coal by assisting Commerce and other DOE offices in a U.S.-Italian coal logistics study.
- Provided policy and technical support throughout the Government on international gas issues, including the Spanish proposal for a natural gas pipeline from Africa to Europe and development of Western European gas supplies.
- Provided protocol support for senior DOE management for visits by foreign energy officials and visits abroad by U.S. officials.
- Identified barriers to free international flow of energy and related goods and services. Made representation in bilateral and multilateral fora to

remove these barriers in order to make trade flows more efficient and open markets to U.S. suppliers.

- Represented U.S. in discussions at the IEA regarding energy and the environment to assure a commitment that energy policy goals would be fully considered in decision regarding imposition of environmental regulation.
- Managed and administered over 130 cooperative energy R&D technical exchange agreements and other commitments, covering more than 260 projects, with foreign nationals and international organizations including the IEA, the Nuclear Energy Agency (NEA), and the International Atomic Energy Agency (IAEA).
- Drafted and negotiated 46 new technical exchange agreements and 28 extensions of existing technical exchange agreements. A total of 14 foreign countries were involved. Technical fields included nuclear energy, radioactive waste management, enhanced oil recovery, natural gas, geothermal, solar, nuclear physics and coal.
- Devised a strategy to seek to achieve optimal use of energy R&D resources here and abroad. A process of international collaboration was promoted and discussed among certain key countries. Under this process, interested countries would share and compare their program plans in various technical areas of energy R&D while they are still being developed, and adjust them accordingly to take full advantage of each other's capabilities. The Governing Board of the IEA, and the Energy Ministers of the IEA, endorsed a series of recommendations that encourages early consultation in the design of program plans, as well as periodic monitoring of progress in collaborative energy R&D at the political level.
- Hosted (with the Office of Fossil Energy) 5 days of discussions on the clean use of coal in which representatives from 11 countries and two international organizations participated which has as an initial outcome, resulted in an endorsed concept of joint program design as an effective means to leverage future R&D efforts.

Our objectives for FY 1986 to FY 1989 are:

- Promote and coordinate expanded international collaboration in energy research and development by DOE with other countries in order to maintain scientific progress and to optimize the utilization of available scientific resources. Actions to be taken include:
  - advising program offices of the policy context in which R&D collaboration is being sought with other countries;
  - assisting offices in identifying opportunities for collaboration abroad;
  - advising program offices from past experience on ways to best approach joint, systematic R&D program planning;

- coordinating and monitoring efforts at enhanced collaboration to ensure that they are consistent from a Department-wide policy perspective, that effective negotiating postures are taken, and that efforts are properly timed and consistent with other USG interests;
- supporting R&D efforts by drafting agreements, coordinating their negotiation and completion, and monitoring their implementation from a policy perspective;
- reporting on progress to the International Energy Agency/Committee for Research and Development and IEA Governing Board, to U.S. Missions abroad, to Congress and other USG agencies as appropriate;
- securing support for enhanced international R&D collaboration outside the Department by briefing other Executive Agencies and Congressional staffs, committees and offices on the objectives to be achieved and the policy rationale; and
- serving as the central reference for international R&D activities for the Department.

° Promote a technical base for the implementation of a Western policy framework to encourage the development of alternatives to Soviet Gas, including ensuring and monitoring our energy commitment to the IEA and implementing specific gas emergency measures.

° Promote the free market in bilateral and multilateral energy relations through, for example, the removal of trade barriers, as the best way to create an environment that will best ensure adequate supplies at reasonable prices.

° Analyze political, economic and energy developments and trends in international markets in order to identify emerging issues which will effect U.S. international energy security interest.

° Promote enhanced cooperation and a more intensive energy policy dialogue with key Asia-Pacific countries in order to strengthen the energy security of this region and prospects for greater U.S. energy exports.

° Continue the historical commitment to maintain and strengthen the international nonproliferation regime. International Affairs considers nuclear nonproliferation one of its primary statutory responsibilities and will continue to exert its best efforts [illegible] protection against the spread of sensitive nuclear technologies.

° Continue support of U.S. efforts to enhance the viability of the Nuclear Nonproliferation Treaty through increased coordination with other agencies in providing technical assistance to other countries.

° Improve and enhance assistance to the IAEA in the fields of technical cooperation with the Agency and in providing focused assistance to selected countries deemed to be of importance for implementing the U.S. program emphasizing key NPT signatories, less-developed, countries.

- Improve U.S. representation in the IAEA through development and management of new recruiting and follow-on program for U.S. candidates for positions deemed of importance to the U.S.
- Continue and intensify efforts to obtain new and revised Agreements for Nuclear Cooperation (as required by the Nuclear Nonproliferation Act).

Accomplishment of our objectives will: provide a sound analytical basis on which to conduct our energy relations with both oil producing and consuming nations; establish and maintain a dialogue with other countries on important global energy matters; enhance U.S. international energy Research and Development collaborative efforts; help reduce the risks of nuclear weapons proliferation while expanding the markets for the peaceful applications of nuclear energy; lessen U.S. vulnerability to energy supply disruptions; and provide accurate and reliable advice and support to the Secretary and other energy policymakers.

FY 1987 Budget Request

INTERNATIONAL POLICY STUDIES

The Office of International Affairs (IA) conducts policy and analytical studies in support of international energy markets, nuclear nonproliferation policy, and international R&D policy. The work in the first two areas is solely the responsibility of IA within DOE. An internal task force on international R&D collaboration clarified the roles and responsibilities between IA and the program offices. Their findings clearly indicate that IA has policy, administrative, and management information responsibilities that are unique to IA and does not duplicate program office activities.

The funding for International Policy Studies assists the Office of International Affairs in carrying out its responsibilities for formulating international energy policy, assessing and analyzing current global energy trends and developments, and advising the Secretary on international energy issues. These studies, models, data acquisitions, etc., provide a basis for examining and assessing developments in the world energy situation which may affect both domestic energy objectives and cooperative energy efforts with other nations. These policy studies provide independent views on complex and continually changing international energy issues. The Office of International Affairs requires these independent, objective views to broaden its analytical base for policy formulation.

The FY 1987 Department Request for International Policy Studies is $1,700,000. This amount exceeds by $737,000 the FY 1986 adjusted appropriation. The need for increased support is primarily related to the area of international R&D collaboration. These policy studies will provide the basis for implementing the Secretary's goal of increasing international involvement as a means of maintaining scientific momentum consistent with increasingly stringent budget requirements. Through a persuasive international R&D policy that convinces our allies of the merits of increased collaboration, R&D program cost savings of more than $20 million dollars per year are clearly feasible. A draft Energy Research Advisory Board (ERAB) study on international R&D collaboration recommends an even stronger role for IA, building upon its unique capabilities and responsibilities. Those who have carefully studied the situation recommend increased funding in policy studies.

The IA studies provide the intellectual capital to formulate R&D collaboration policies consistent with overall foreign policy, to improve our ability to understand foreign country energy technology programs within the context of their overall energy policy, to develop strategies that will ensure that our international collaboration activities will provide significant benefits to this country and to develop negotiating positions for bargaining with specific countries, including possible multiple technology arrangements.

Our policy studies money provide the funding to develop and operate essential management information systems on our international agreements and their related commitments; on the status of agreements in negotiation and the key negotiating points; on administrative arrangements and impediments so that prompt, effective action may be taken to ensure efficient collaboration; on total foreign travel to improve coordination and reduce excess travel; and on foreign visitors and assignees to U.S. facilities to improve control of technology transfer. Specific proposed projects in the International R&D Policy area are:

- Analysis of impact of Energy Technology on Energy Security to support IA participation in the formulation of an R&D Policy for IEA.
- Analysis of policy factors in R&D Cooperation that will permit adequate input of past experience in the development of new cooperative arrangements.
- Analyses of strategies for enhanced private sector involvement in international cooperation and the trade impacts of international energy R&D cooperation.
- A system to track the status of international agreements, negotiations, and commitments so that DOE can be assured that it is meeting its obligations;
- A system to monitor all foreign travel and visitors to ensure a coordinated DOE approach in R&D discussions and negotiations;
- The establishment of a DOE centralized document system to provide improved access to critical information to respond to the needs of the Secretary, OMB and the Congress;
- The development of foreign country technology profiles on key programs, individuals, organizations, and foreign policy to assist in the development of negotiating strategies;
- The assessment of benefits and costs for the United States to ensure that technology program collaboration will provide improved economic efficiency in achieving long-range objectives.

In the nuclear area, specific proposed studies are:

- Nuclear Nonproliferation Studies: Developments in international nuclear nonproliferation issues require specific expert assistance and often occur with little or no notice and require immediate response in order to provide necessary information and options for policy decisions by top DOE management. Quick response contracts or task orders from recognized experts in various nuclear nonproliferation issues are required in order to provide this essential input.

- Support of DOE Responsibilities re IAEA: IE has responsibility for supporting DOE management in all activities connected with the IAEA. This includes the analysis of current events and preparation of special material for support of DOE management, including preparation of special briefing materials. Such response often requires the utilization of specialized contractors with specific expertise in the area.

- IAEA Recruitment Support: Certain positions in the IAEA are of considerable importance to furtherance of U.S. foreign policy goals in international safeguards and nuclear nonproliferation. In order to effectively project key openings and to implement effective recruitment and briefing activities, a system needs to be developed that would allow effective planning and action to meet our goals. Contract services are required to develop, test and implement such a system.

- NPT review conference: A major goal for the U.S. is to demonstrate the value of the Treaty to developing countries to assure continued adherence and to encourage additional countries to become signatories. The most commonly requested technical assistance is in the area of energy planning and analysis, particularly nuclear power options. Building on the program developed as an initiative for the 1985 Review Conference, a series of conferences/seminars are planned to assist developing countries in improving their ability to plan their energy sector activities.

In the area of energy market and policy analysis, several studies are needed to support priority issues:

- Oil Market studies: It will continue to be critically important to the U.S. energy security interests to keep abreast of the policies of the oil producing countries, developments in oil production capabilities and in changing patterns of crude oil and product trade. Areas where policy studies are required include:

  -- Implications of investments by the oil producing countries in downstream oil refinery and petro-chemical facilities on oil trading patterns, particularly in Europe.

  -- The investment climate for hydrocarbon exploration in LDC's and the impact on the extent of R&D activity.

- Changes in the structure of the world oil market and their impact on oil security.

- The impact of oil product imports from new OPEC refineries on the world oil market and on the energy security of key industrialized countries.

- Oil Tanker Market Reports: Monthly reports on the world oil tanker market that facilitate understanding of oil market developments and emergency planning participation in IEA and NATO.

- Natural Gas Demand Analysis: Following up on FY 86 technical analysis of natural gas supply alternatives for Europe, study of European demand and price scenarios in the 1990s will be required to evaluate commercial viability of alternative supplies identified. This follow-on work is essential to assure continued U.S. influence over gas decisions being made by our allies.

- Coal Use Policies: Study to identify remedies to factors that restrict penetration of coal (and level of U.S. coal exports) in OECD coal markets and perform cost/benefit analysis of measures to reduce/eliminate restrictions.

- Removal of Trade Barriers: Analysis of the effect of barriers to trade of energy and related goods and services on development and exchange of indigenous OECD energy resources. This study will provide analytical base to propose concrete program to eliminate these barriers. This will increase OECD collective energy security and open markets for U.S. energy (coal and enrichment services) and energy related goods and services.

INTERNATIONAL AFFAIRS PROGRAM DIRECTION

The FY 87 Department Request for Program Direction is $3,380,000 for 51 FTEs. The current funding and staffing for this activity in FY 86 is $2,976,000 with a staffing level of 51 FTEs. The requested increase is primarily for increased Department of State (DOS) administrative support costs for overseas representatives and energy related programs at the IAEA Mission in Vienna. Requested funding provides for salaries, benefits, and travel for International Affairs' in-house civil service employees. This level also provides funding for two DOE overseas offices, including personnel and administrative support and includes funds for DOS reimbursement for IAEA desk officer support in the U.S. Mission, Vienna. International Affair's current functions, notwithstanding any new requirements that may be levied by the White House, the Secretary of Energy or the Congress, include but are not limited to:

- Prepare material for use by the Secretary and the AS/IE to be used in the formulation of international nuclear nonproliferation policy by DOE, NSC, the President, Departments of Defense and State, and ACDA.

- Respond to the increasing number of congressional legislative initiatives and inquiries on nuclear nonproliferation and when requested, work with Members of Congress and their staffs in the area of policy guidance on nonproliferation and technical cooperation issues.

- Participate in a number of interagency groups working to define the Administration's nonproliferation policy.

- Maintain historical information and a chronology of significant events involving nonproliferation, particularly on sensitive countries.

- Maintain a close advisory relationship with the Assistant Secretaries of Defense Programs and Nuclear Energy on export controls of U.S. nuclear technology, goods and services, particularly to sensitive countries.

- Prepare issue papers on current events throughout the world affecting nonproliferation.

- Representation by DOE in the NEA and IEA, as well as provide the support functions that go along with representation.

- Provide the Secretary of Energy and the AS/IE background information and data on visiting U.S. officials (such as Ambassadors) and on foreign officials in the nonproliferation area.

- Participate in bilateral meetings where discussions of nonproliferation issues will take place.

- Administer the implementation of approximately 100 bilateral technical exchange arrangements and subsidiary arrangements with 23 foreign countries, 26 multilateral IEA agreements, and 6 multilateral NEA agreements.

- Draft and negotiate technical exchange agreements and subsidiary arrangements with foreign entities, in coordination with DOE program offices, General Counsel, Controller, and State.

- Arrange international cooperative technical activities other than agreements, such as equipment loans and work for others pursuant to DOE Order 4300.2.

- Maintain cognizance of energy R&D policies and programs in foreign countries. This requires systematic collection of classified and unclassified material from U.S. and foreign sources, and maintenance of responsive filing systems.

- Coordinate DOE's international R&D activities to insure consistency with approved policy procedures.

- Prepare briefs, position papers, memoranda for record, and reporting cables for meetings with senior foreign energy R&D officials.

- Provide representation to the National Security Council's Interagency Group for the Arctic and Antarctic, and for Ocean Laws and Policy.

- Inform senior DOE officials of the impact of significant developments in foreign energy R&D policies and programs.

- Inform foreign governments of important developments in U.S. energy R&D policies and programs.

- Review and authorize, based on foreign policy considerations, the foreign travel of all Department and contractor personnel. With computer support, monitor on a current basis the foreign travel of all Department personnel, advising Secretarial offices on trends, sensitive areas, and provide summaries for use by senior officials in scrutinizing appropriateness of foreign travel.

- Represent DOE in the IEA's policy forum on energy R&D, the IEA Committee on R&D.
- Review and authorize, based on foreign policy considerations, visits and long-term assignments of foreign officials and R&D personnel to DOE laboratories and facilities; monitor levels of foreign presence.
- Coordinate meetings and briefings for foreign visitors to DOE Headquarters.
- Coordinate energy cooperative activities under bilateral interagency science and technology agreements with several countries such as Spain, Yugoslavia, Mexico and India; including administering the selection and implementation of energy projects, coordination of exchange of scientists and technical experts, and organization of seminars and workshops on energy R&D.
- Monitor and analyze oil price and supply/demand trends in the world oil market, with a focus on short-term developments and on the major consuming and producing countries.
- Analyze the international impacts of natural gas price regulations and rulings.
- Monitor and analyze natural gas developments in the world market, with particular emphasis on a gas supply negotiations between the OPEC countries and industrialized countries.
- Assess the impact of major political, economic, and energy developments in key consuming and producing countries on energy security and U.S. bilateral relations.
- Manage U.S. participation in the U.S.-Korea Energy Subgroup chaired on the U.S. side by the Assistant Secretary for International Affairs and Energy Emergencies.
- Handle congressional testimony on oil market and regional energy issues, including preparation of testimony, briefing of DOE principals, and response to follow-up inquiries.
- Provide lead representation for the U.S. Government at the IEA Standing Group in the Oil Market (SOM) , and the Standing Group on Long-Term Cooperation (SLT) and design the analytical efforts of these bodies.
- Hold periodic consultations with Mexicans and Venezuelan officials on oil market developments and outlook.
- Represent DOE in the U.S.-Japan Energy Working Group and its technical subgroup, involving the preparation of presentations and negotiating strategies to enhance bilateral oil, coal and gas trade.

- Handle DOE participation in interagency trade policy committee meetings.

- Support and prepare material for use by the Secretary and the AS/IE, or other senior DOE/USG officials when representing the U.S. in bilateral negotiations and consultations or in multilateral international meetings (including the IEA Ministerial and Governing Board).

- Monitor and analyze developments in the world oil tanker market.

- Represent U.S. Government at the IEA Conservation Subgroup with a view to assuring proper emphasis on role of market forces in achieving greater energy use efficiency.

- Identify barriers to free international trade of energy and related goods and services, analyze detrimental effects of such barriers, and recommend methods to reduce or eliminate energy trade barriers.

- Develop, staff and manage new program to ensure improved placement and support of U.S. nationals in key positions in the IAEA.

- Provide improved coordination and planning between DOE program offices and activities of the IAEA so as to make maximum contribution to both the Agency and to the program offices.

- Implement and maintain newly developed administrative arrangements for the management of nuclear materials with countries with which we have Agreements for Cooperation.

- Support the International Atomic Energy Agency and other international bodies in the field of nuclear nonproliferation and safeguards.

- Draft, coordinate, and negotiate international technical cooperation agreements under existing bilateral and multilateral programs, and deal with expanding international cooperation efforts driven by escalating R&D costs. Develop negotiating and implementation strategies for international cooperative efforts in order to gain maximum benefits for the U.S.; strengthen planning for cooperation, evaluating costs and benefits of specific efforts.

- Investigate long-term oil market issues such as the long-term security implications of OPEC investments in downstream oil facilities; long-term supply demand forecasts and their implications for international energy policy development (consistent with the NSDD-9 Directive); the oil policies and regimes of individual OPEC decisionmakers in order to better assess future OPEC policy developments and conflicts.

- Analyze international coal and nuclear market trends and outlook particularly in regard to their implications for U.S. coal and nuclear trade prospects.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
POLICY AND MANAGEMENT - IE
DEPARTMENTAL ADMINISTRATION
(Tabular Dollars in Thousands, Narrative Material in Whole Dollars)

Policy & Management - IE	FY 1985 Appropriation	FY 1986 Adjusted Appropriation	FY 1987 Base	FY 1987 Request	Request vs Base
Departmental Administration Operating Expenses. . . .	$590	$708	$710	$710	$2
Staffing Total FTE's: Direct.	11 1/	12	12	12	$0

Authorization: P.L. 95-91

1/ Reflects actual FTE's consumed in FY 1985.

SUMMARY OF CHANGES
Policy and Management - IE

FY 1986 enacted appropriation	$708
Built in increases and decreases:	
° Increase for merit pay and within grades	+ 2
FY 1986 base.	$710
Programmatic increases and decreases:	
° None	
FY 1987 budget request.	$710

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION

POLICY AND MANAGEMENT - IE

The purpose of the Policy and Management decision unit it to provide executive direction, management assistance and administrative support to all programs of the Office of the Assistant Secretary for International Affairs and Energy Emergencies (IE). The resources requested in this decision unit support the immediate office of the Assistant Secretary, including the Management Services Staff.

The Assistant Secretary for International Affairs and Energy Emergencies is the principal advisor to the Secretary of Energy for developing international energy policy; analyzing, assessing and monitoring domestic and world energy markets and technological developments; assessing energy supply vulnerability and the international implications of U.S. contingency plans; developing emergency preparedness and contingency planning measures; developing, negotiating and assessing U.S. international nuclear policies, and maintaining relationships with foreign governments and international energy organizations. Principal activities include developing and analyzing policy issues, monitoring programs and developments, preparing for Congressional hearings and public appearances, and coordination of issues and activities with senior management in DOE, with OMB, the White House, the State Department and other agencies, and liaison with the Congress.

The Management Services Staff provides planning, budget preparation and execution, procurement and contracts administration, and financial management. It also performs management analyses, correspondence control, administration of personnel and training matters, and coordination of general administrative services activities which cut across organizational lines.

Fiscal Year 1985 accomplishments include:

- Advised and supported the Secretary and other senior DOE officials on matters relating to international affairs and emergency preparedness activities.
- Executed a comprehensive financial reporting system to include all procurement, travel, payroll, and FTE usage.
- Provided administrative and personnel support for approximately 150 employees.
- Prepared and coordinated functional realignments, staffing analyses, and reorganizational documents for the Office of International Affairs and Energy Emergencies, which resulted in elimination of organizational layers, cost savings, and more efficient utilization of staff. (The resulting reorganizations were designed to implement activities in the areas of international energy analysis, energy emergency policy and evaluation activities, and increased emphasis on nuclear nonproliferation responsibilities.)

- Performed preliminary reviews of a number of adjunct areas, including correspondence control, adherence to Departmental security requirements, and administrative services needs.

Specific objectives for FY 1986 and 1987 include:

- Provide executive direction to the programs.
- Advise and support senior officials on the needs, actions and priorities for the programs supported.
- Direct and coordinate budget formulation and execution activities.
- Conduct evaluations on program effectiveness and efficiency.
- Enhance the quality of responsiveness to the Secretary, other senior officials, Congress, and the public.
- Complete internal analysis and review of functional assignments.

Accomplishment of these objectives will provide for the orderly, timely and efficient achievement of program goals and objectives resulting in increased program effectiveness for IE's international affairs and energy emergencies programs.

FY 1987 Request $710,000

The request for this unit includes 12 full-time equivalent positions. Funds requested are for salaries, benefits and travel as well as $100,000 for contractual support. Contractual support includes management information system maintenance, support services for administrative improvements and word processing maintenance and upgrading. This staffing level is sufficient to sustain the work load projected for FY 1987. All program activities supported by this decision unit are expected to remain the same as FY 1986 or increase. Activities which must be continued include basic executive direction and administrative support for major IE program elements to achieve their program goals and objectives. Functions that must be carried out with these staff years include:

- Preparation of periodic reports and analyses of IE expenditures.
- Implement a program of internal control systems with respect to expenditures and receipts (with recommendations to ASIE if required).
- Analysis and coordination of IE procurement activities.
- Analysis of personnel management issues and ceiling control procedures.

- Effective and timely response to Federal Register requirements, GAO and Congressional inquiries, and crosscutting DOE activities.

These staff-year resources are adequate to assure the minimum management support provided to IE operating programs. This level assumes greater utilization of staff through on-the-job training, while maintaining essentially the same staffing levels as requested in FY 1986. It is important to note the following additional work is expected:

- Greater interface and response with GAO, IG, and other audit groups as management improvements are implemented.

- Greater scrutiny to procurement activities and agreements with elements within DOE such as the laboratories and field offices, and international organizations such as the International Atomic Energy Agency, the Department of State, and the Agency for International Development.

- Overall program direction to insure efficiencies are built in to our programs and results are achieved.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

COST OF WORK FOR OTHERS

The Department's FY 1987 Budget Request for Cost of Work for Others Program is $115,050,000. This represents the current estimates of the costs to be incurred to provide non-DOE customers with products and services. The Cost of Work for Others Program provides funding to the Department of Energy's multi-purpose operations offices and national laboratories to finance the cost of work products and services requested by non-DOE customers, both foreign and domestic. The products and services provided by the Department under this program generally are not available from alternate sources. Examples of such items include special reactor materials, isotopes, irradiation and test reactor services, and special testing activities at the Nevada Test Site. Products like radioisotopes that are supplied through this program are essential in medical research. The costs of the Cost of Work for Others Program is offset by revenues received from the sale of products and services to our customers.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
COST OF WORK FOR OTHERS
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted	FY 1987 Base	FY 1987 Request	Request vs. Base
Cost of Work for Others:					
--Cost of Products Sold Operating Expenses.........	$ 24,987	$ 45,726	$ 20,618	$ 20,618	$ ---
--Cost of Services Provided Operating Expenses.........	90,717	97,817	94,432	94,432	---
Total, Cost of Work for Others..................	$115,704	$143,543	$115,050	115,050	$ ---

Authorization: Section 161, P.L. 83-703

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
COST OF WORK FOR OTHERS
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

FY 1986			$143,543
Cost of Products:			
o Sales of Heavy Water for commercial users at Savannah River Operations Office		-65	
o Decrease cost for radioisotopes ($17,000) and stable isotopes ($1,680,000) at Oak Ridge National Lab		-1,697	
o Decrease cost for stable isotopes at the Mound Plant Facility for Albuquerque Operations Office		-188	
o Miscellaneous:			
- Decrease of foreign sales and special materials to support the United Kingdom Production Program for the Trident System at Albuquerque Operations Office. The funding for this UK program was switched from CWO to Reimbursable	-23,766		
- Increase timber sales at Savannah River Operations Office	+607		
- Cancellation of mercury sales to GSA at Oak Ridge Operations Office	-172		
- Increase in the cost of miscellaneous isotopes at Oak Ridge National Lab	+171		
- Increase costs of handling charges	+5	-23,158	-25,108
Cost of Services Performed:			
o Decrease in the Use of DOE-owned Facilities and Equipment		-181	
o Decrease in Irradiation & Test Reactor Experiments		-872	
o Decrease in Security Investigations		-5	
o Decrease in Special Services & Fabrication		-466	
o Decrease in the Research for Protection of Public Health and Safety		-2,542	
o Miscellaneous:			
- Increase in the United Kingdom program at the Albuquerque Operations Office	+2,261		
- Increase in research projects for Brookhaven National Lab	+389		
- Increase at Idaho Operations Ofc for Geothermal Geopressure contract, EPRI - Electric Vehicle, MHD - Various contractors	+1,909		
- Increase in activities at the Nevada Operations Office	+16,181		
- Decrease in various service contracts at Oak Ridge National Lab	-1,991		

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
COST OF WORK FOR OTHERS
DEPARTMENTAL ADMINISTRATION
(Tabular dollars in thousands. Narrative material in whole dollars.)

- Changes at Oak Ridge Operations Office:			
1) Decrease in grant studies for Oak Ridge Associated Universities..........	-813		
2) Increase in furnishing treated water to City of Oak Ridge..................	+153		
3) Miscellaneous..........................	+27		
- Increase of various R&D contracts with Westinghouse at Richland Operations Office..................................	+1,708		
- Increase for test evaluation and management support for Rockwell International at San Francisco Operations Office........	+111		
- Changes at Lawrence Berkeley Lab:			
1) Cancellation of research contract with National Institute of Health......	-9,814		
2) Increase with the University of California for Ten Meter Telescope.....	+1,585		
3) Decrease in research contract with Germany................................	-92		
- Closeout of research contract for France and the United Kingdom at Lawrence Livermore Lab.............................	-10,765		
- Decrease at Savannah River Operations for completion of EPRI contract...............	-168	+681	-3,385
Total, FY 1987 Budget Request..			$115,050

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION
COST OF WORK FOR OTHERS
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1986	FY 1987
Costs of Products Sold:		
o Nuclear Reactor Materials Represents Heavy Water sales at Savannah River Operations Office.	$ 63	$ -0-
o Radioisotopes Estimated cost for all radioisotopes including specified fission products and various by-products at Oak Ridge National Lab.	6,153	6,133
o Stable Isotopes Estimates cost of sales for all stable isotopes produced at Mound Plant Facility for Albuquerque and at the Oak Ridge National Laboratory.	4,390	2,522
o Miscellaneous Products	35,120	11,963
-- Cost of foreign sales of weapon components and special materials at Albuquerque Operations Office	(31,768)	(8,000)
-- Timber sales at the Savannah River Operations Office	(2,253)	(2,860)
-- Miscellaneous products at Oak Ridge National Lab.	(663)	(834)
-- Costs associated with the sale of excess mercury at Oak Ridge Operations Office	(173)	(-0-)
-- Handling charges in conjunction with the sales from isotopes	(263)	(269)
Subtotal, Products Sold	$ 45,726	$20,618
Costs of Services Provided:		
o Use of DOE Facilities Cost to lease Government-owned technical equipment, such as spectrometers, and computers, and use of facilities for energy research activities.	$ 3,331	$ 3,150
o Irradiation Services and Test Reactor Experiments Cost of irradiation services DOE performed in DOE-owned facilities for non-DOE users including special processing and handling of radioactive materials.	2,267	1,395

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION
COST OF WORK FOR OTHERS
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1986	FY 1987
o Special Services and Fabrications.................... Cost of performing technical services for non-DOE users such as special research and development studies and treating municipal water supplies near DOE facilities.	$ 1,041	$ 575
o Research for Protection of Public Health and Safety.. Cost of reimbursed technical assistance related to public health and safety activities involving special studies, R&D, and training for handling radioactive materials.	10,642	8,100
o Miscellaneous Services.............................	80,536	81,212
-- Includes services to foreign government with $5,000,000 towards the Hot Dry Rock ($2,500,000 for Japan and $2,500,000 for Germany) and new contract with Prudential-Bache ($2,400,000) at Albuquerque Operations Office.................	(6,739)	(9,000)
-- Various research projects for Brookhaven National Lab...	(4,611)	(5,000)
-- Includes funding for three new contracts (Geothermal, EPRI, and MHD) at Idaho Operations...	(96)	(2,000)
-- Construction, execution, post-shot drilling activities, engineering, design and technical studies, and analysis of nuclear tests at Nevada Operations Office..........................	(28,206)	(44,387)
-- Special preparation, protection, and shipping of heavy elements at Oak Ridge National Lab.......	(8,024)	(6,033)
-- Various studies performed by Oak Ridge Assoc. Universities and treated water furnished to city of Oak Ridge................................	(2,530)	(1,897)
-- Various R&D contracts with Westinghouse and service contracts with Hanford at Richland Operations Office................................	(2,919)	(4,627)
-- Experimental and development programs and technical support to non-DOE R&D activities at San Francisco Operations Office....................	(289)	(400)
-- R&D contracts at Lawrence Berkeley Laboratory.....	(14,921)	(6,600)
-- Various R&D contracts at Lawrence Livermore Lab...	(12,033)	(1,268)
-- Other miscellaneous	(168)	(-0-)
Subtotal, Services Provided..........................	$ 97,817	$ 94,432
TOTAL, COST OF WORK FOR OTHERS........................	$143,543	$115,050

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

REVENUES

This represents the current estimate of the revenues received in FY 1987 from the sale of products and services. The Department's FY 1987 budget estimate of $251,947,000 represents the estimated revenues to be received based on performing a $115,050,000 Cost of Work for Others Program and from $108,519,000 in other revenues not associated with Cost of Work for Others. Revenues of $143,428,000 offset the $115,050,000 in the Cost of Work for Others program associated with supplying products and services to our customers. In addition to the revenues received that are directly related to the Cost of Work for Others program, other revenues of $108,519,000 are received from the sale of by-products that have no costs associated with the Departmental Administration appropriation. These items are incidential by-products of activities funded from other Departmental programs, such as the sale of steam to WPPSS, which is a by-product of operating a Nuclear Reactor funded by the Materials Production program and the sales from the reprocessing irradiated fuel to the Navy Department, which is a by-product of operating the Idaho Chemical Processing Plant funded by the Nuclear Materials Production program.

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
LEAD TABLE
REVENUES
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Appropriation	FY 1986 Adjusted	FY 1987 Base	FY 1987 Request	Request vs. Base
Revenues Associated with Cost of Work:					
--Products Sold Operating Expenses.........	$ 28,148	$ 51,974	$ 25,463	$ 25,463	$ ---
--Services Provided Operating Expenses.........	100,003	109,769	117,965	117,965	---
Subtotal, Revenues Operating Expenses........	$128,151	$161,743	$143,428	$143,428	$ ---
Miscellaneous Revenues Not Associated with Cost of Work:					
--Operating Expenses.........	91,308	82,485	108,519	108,519	$ ---
Total, Revenues.............	$219,459	$244,228	$251,947	$251,947	$ ---

Authorization: Section 161, P.L. 83-703

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
REVENUES
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

FY 1986			$244,228
Revenues Associated with Cost of Work:			
Revenues from Products:			
o Sales of Heavy Water for commercial users at Savannah River Operations Office		-100	
o Increase cost for radioisotopes ($660,000) and decrease for stable isotopes ($1,856,000) at Oak Ridge National Lab		-1,365	
o Increase cost for stable isotopes at the Mound Plant Facility for Albuquerque Operations Office		+299	
o Miscellaneous:			
- Decrease of foreign sales and special materials to support the United Kingdom Production Program for the Trident System at Albuquerque Operations Office. The funding for this UK program was switched from CWO to reimbursable	-25,511		
- Increase timber sales at Savannah River Operations Office	+150		
- Cancellation of mercury sales to GSA at Oak Ridge Operations Office	-180		
- Increase of miscellaneous isotopes at Oak Ridge National Lab	+125		
- Increase costs of handling charges	+71	-25,345	-26,511
Revenues from Services Performed:			
o Increase in the Use of DOE-owned Facilities and Equipment		+3,185	
o Decrease in Irradiation & Test Reactor Experiments		-590	
o Decrease in Security Investigations		-3	
o Decrease in Special Services & Fabrication		-231	
o Decrease in the Research for Protection of Public Health and Safety		-2,145	
o Miscellaneous:			
- Increase in the United Kingdom program at the Albuquerque Operations Office	+3,218		
- Increase in research projects previously funded under accounts receivable for Brookhaven National Lab	+715		
- Increase at Idaho Operations Office for Geothermal Geopressure contract, EPRI - Electric Vehicle, MHD - Various contractors	+1,570		

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
SUMMARY OF CHANGES
REVENUES
DEPARTMENTAL ADMINISTRATION
(Tabular dollars in thousands. Narrative material in whole dollars.)

- Increase activities at the Nevada Operations Office	+21,762		
- Decrease in various service contracts at Oak Ridge National Lab	-1,740		
- Changes at Oak Ridge Operations Office:			
1) Decrease in grant studies for Oak Ridge Assoc. Universities	-794		
2) Increase in furnishing treated water to City of Oak Ridge	+236		
3) Miscellaneous	+90		
- Increase of various R&D contracts with Westinghouse at Richland Operations Office	+2,121		
- Increase for test evaluation and management support for Rockwell International at San Francisco Operations Office	+90		
- Changes at Lawrence Berkeley Lab:			
1) Cancellation of research contract with National Institute of Health	-9,874		
2) Increase with University of California for Ten Meter Telescope	+1,888		
3) Decrease in research contract with Germany	-87		
4) Increase in research contract with EPRI	+60		
- Closeout of research contract for France and the United Kingdom at Lawrence Livermore National Laboratory	-11,105		
- Decrease at Savannah River Operations for completion of EPRI contract	-170	+7,980	+8,196

Miscellaneous Revenues Not Associated With Cost of Work:

o Increase in the Sale of Nuclear Reactor Steam	+12,800	
o Increase in Recovery of Nuclear Materials	+11,700	
o Increase in the Sale of Nuclear Materials	+1,372	
o Increase in Other Miscellaneous Revenues	+162	+26,034
Total, FY 1987 Budget Request		$251,947

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION
REVENUES
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

Revenues from Products Sold:	FY 1986	FY 1987
o Nuclear Reactor Materials............................ Represents Heavy Water sales at Savannah River Operations Office.	$ 100	$ -0-
o Radioisotopes.. Estimated cost for all radioisotopes including specified fission products and various by-products at Oak Ridge National Lab.	7,033	7,693
o Stable Isotopes...................................... Estimates cost of sales for all stable isotopes produced at Mound Plant Facility for Albuquerque and at the Oak Ridge National Laboratory.	5,379	3,821
o Miscellaneous Products...............................	39,462	13,949
-- Cost of foreign sales of weapon components and special materials at Albuquerque Operations Office................................	(36,900)	(11,220)
-- Timber sales at the Savannah River Operations Office................................	(1,280)	(1,430)
-- Miscellaneous products at Oak Ridge National Lab.	(835)	(961)
-- Costs associated with the sale of excess mercury at Oak Ridge Operations Office....................	(180)	-0-
-- Handling charges in conjunction with the sales from isotopes..............................	(267)	(338)
Subtotal, Products Sold................................	$ 51,974	$25,463
Revenues from Services Provided:		
o Use of DOE Facilities................................ Cost to lease Government-owned technical equipment, such as spectrometers, and computers, and use of facilities for energy research activities.	$ 3,085	$ 6,270
o Irradiation Services and Test Reactor Experiments.... Cost of irradiation services DOE performed in DOE-owned facilities for non-DOE users including special processing and handling of radioactive materials.	$ 2,070	$ 1,480

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION
REVENUES
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1986	FY 1987
o Special Services and Fabrications.................... Cost of performing technical services for non-DOE users such as special research and development studies and treating municipal water supplies near DOE facilities.	$ 919	$ 688
o Research for Protection of Public Health and Safety.. Cost of reimbursed technical assistance related to public health and safety activities involving special studies, R&D, and training for handling radioactive materials.	11,055	8,910
o Miscellaneous Services..............................	92,660	100,617
-- Services to foreign government with $5,000,000 towards the Hot Dry Rock ($2,500,000 for Japan and $2,500,000 for Germany) and new contract with Prudential-Bache ($2,400,000) at Albuquerque Operations Office................................	(7,100)	(10,318)
-- Various research projects for Brookhaven National Lab.......................................	(4,785)	(5,500)
-- Includes funding for three new contracts (Geothermal, EPRI and MHD) at Idaho Operations....	(100)	(1,650)
-- Construction, execution, post-shot drilling activities, engineering, design and technical studies, and analysis of nuclear test at Nevada Operations Office..........................	(37,010)	(58,772)
-- Special preparation, protection, and shipping of heavy elements at Oak Ridge National Lab.......	(8,695)	(6,955)
-- Various studies performed by Oak Ridge Associated Universities and treated water furnished to City of Oak Ridge..	(2,751)	(2,283)
-- Various R&D contracts with Westinghouse and decontamination services at Richland Operations Office................................	(3,690)	(5,810)
-- Experimental and development programs and technical support to non-DOE R&D activities at San Francisco Operations Office..................	(330)	(440)
-- R&D contracts at Lawrence Berkeley Laboratory.....	(15,500)	(7,488)
-- Various R&D contracts at Lawrence Livermore Lab...	(12,500)	(1,395)
-- Other miscellaneous	(179)	(6)
Subtotal, Services Provided............................	$109,769	$117,965
Subtotal, Revenues.....................................	$161,743	$143,428

DEPARTMENT OF ENERGY
FY 1987 CONGRESSIONAL BUDGET REQUEST
NARRATIVE JUSTIFICATION
REVENUES
DEPARTMENTAL ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

Revenues Not Associated with Cost of Work:	FY 1986	FY 1987
Defense Programs		
o Sale of N-Reactor Steam:		
- Richland Operations Office........	$ 51,200	$ 64,000
o Recovery of Nuclear Material:		
- Idaho Operations Office...........	19,100	30,800
- Savannah River Operations Office..	3,500	3,500
o Sale of Nuclear Material:		
- Oak Ridge National Lab............	205	200
- Savannah River Operations Office..	500	---
- Pittsburgh Naval Reactor..........	7,300	8,677
o Sale of Timber:		
- Oak Ridge National Lab............	95	120
Subtotal, Defense Programs........	$ 81,900	$107,297
Nuclear Programs		
o Lease of Uranium Bearing Land:		
- Idaho Operations Office...........	$ 175	$ 165
o Lease of Materials:		
- Oak Ridge Operations Office.......	51	50
- Oak Ridge National Lab............	7	635
Subtotal, Nuclear Products........	$ 233	$ 850
Miscellaneous		
o Oak Ridge Operations Office.........	$ 20	$ 70
o Oak Ridge National Lab:		
- Isotope Containers................	70	75
- Atomic Data Centers...............	12	12
- Interest on Delinquent Accounts...	50	50
o Richland Operations Office:		
- Miscellaneous Services for WPPSS..	80	80
- Vending Machine Sales.............	10	10
o Nevada Operations Office:		
- Vending Machine Sales.............	10	10
o Albuquerque Operations Office.......	---	---
o Savannah River Operations Office:		
- Use Charges, Deer Hunts...........	100	65
Subtotal, Miscellaneous...........	$ 352	$ 372
Total, Revenues Not Associated With Cost of Work......................	$ 82,485	$108,519
TOTAL, REVENUES........................	$244,228	$251,947

CONGRESSIONAL BUDGET REQUEST

FY 1987

VOLUME 8

FEDERAL ENERGY REGULATORY COMMISSION

U.S. DEPARTMENT OF ENERGY

FEBRUARY 1986

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

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Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

Summary of Programs

Operating Expenses

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Actual	FY 1986 Appropriation 1/	FY 1987 Request
Natural Gas Regulation - Operating Expenses	$ 46,989	$ 46,231	$ 45,174
Hydropower Regulation - Operating Expenses	25,686	27,990	29,343
Oil Pipeline Regulation - Operating Expenses	4,034	3,782	4,139
Electric Power Regulation- Operating Expenses	20,821	20,849	20,423
Total Operating Expenses	$ 97,530	$ 98,852	$ 99,079
Estimated Offsetting Collections	-42,761	-49,470	-78,754
Estimated Net Expenses	$ 54,769	$ 49,382	$ 20,325

1/ Includes $3,284,000 for restoration of pay cut transferred from the Energy Supply, Research and Development Activities Appropriation per Conference Report (99-307) accompanying Public Law 99-141.

Authorization:

Natural Gas Regulation:	Natural Gas Act; Alaska Natural Gas Transportation Act; Natural Gas Policy Act; Public Utility Regulatory Policies Act; Department of Energy Organization Act; Outer Continental Shelf Lands Act; Energy Security Act; Crude Oil Windfall Profit Tax Act; Regulatory Flexibility Act; National Environmental Policy Act; and the National Historic Preservation Act.
Hydropower Regulation:	Federal Power Act; Public Utility Regulatory Policies Act; Flood Control and River and Harbor Acts; Reclamation Project Act; Water Resources Planning Act; Department of Energy Organization Act; Energy Security Act; Regulatory Flexibility Act; Crude Oil Windfall Profit Tax Act; Pacific Northwest Electric Power Planning and

	Conservation Act; Wild and Scenic Rivers Act; National Historic Preservation Act; Clean Water Act; National Environmental Policy Act; Coastal Zone Management Act; Endangered Species Act; Fish and Wildlife Coordination Act; Federal Pollution Control Act; and the Niagara Redevelopment Act.
Oil Pipeline Regulation:	Interstate Commerce Act; Department of Energy Organization Act; Regulatory Flexibility Act; Outer Continental Shelf Lands Act; Crude Oil Windfall Profit Tax Act; and the Deepwater Port Act.
Electric Power Regulation:	Federal Power Act; Public Utility Regulatory Policies Act; Powerplant and Industrial Fuel Use Act; Department of Energy Organization Act; Energy Security Act; Regulatory Flexibility Act; Crude Oil Windfall Profit Tax Act; Pacific Northwest Electric Power Planning and Conservation Act; Flood Control and River and Harbor Acts; Bonneville Project Act; Eklutna Project Act; Falcon and Amisted Dam Act; Federal Columbia River Transmission Act; Reclamation Project Act; Nuclear Waste Policy Act; National Environmental Policy Act; and the Public Utility Holding Company Act.

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

Summary of Changes
($000's)

	FTE	Amount
FY 1986 Appropriation	1,659	$98,852
Adjustments of Base: (Inflationary and fixed cost changes)		
Benefits...................................	...	- 383
Other Personnel Compensation................	...	- 16
Travel and Transportation of Persons........	...	+ 94
Transportation of things	...	- 83
Rents, Communications and Utilities.........	...	+ 187
Printing and Reproduction..................	...	+ 139
Other Services.............................	...	+ 342
Supplies and Materials.....................	...	+ 58
Equipment	...	+ 160
FY 1987 Base	1,659	$99,350
Program Changes:		
° Natural Gas Regulation		
Shift in support resources	-6	-1,290
° Hydropower Regulation		
Increase in resources to fund additional environmental requirements; shift in support resources	+2	+1,212
° Oil Pipeline Regulation		
Increase in staffing for additional formal rate activity; shift in support resources	+5	+ 338
° Electric Power Regulation		
Shift in support resources	-1	- 531
FY 1987 Request	1,659	$99,079

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

The Federal Energy Regulatory Commission's (FERC) FY 1987 budget request totals $99,079,000 to support a staffing level of 1,659 full-time equivalent (FTE) staff years. The FY 1987 request represents the same staffing level and an increase of $227,000 in obligational authority over the FY 1986 level of $98,852,000.

Over the past several years, competition and market forces have begun to replace the regulatory environment as the key determinant of business performance for many of the regulated utilities. Whereas stability and certainty were once taken for granted in the utility business, risk and uncertainty now seem to characterize many companies.

In recognition of these changed conditions, the FERC has embarked on a course to consider modifications in its existing regulatory practices to accommodate the new business environment. This is evidenced by our recently issued Order No. 436 for natural gas pipelines and the Notice of Inquiry on wholesale electricity sales. Embodied in these initiatives is the notion that competition can often be employed usefully to protect the public interest by complementing traditional regulatory practices, and that companies should be given the flexibility to adjust to changes in their competitive environment.

The Commission's FY 1987 budget reflects the new environment as well as recent judicial interpretations of Commission responsibilities. In FY 1987, the emphasis will be on managing the changing workload fashioned by external forces in the natural gas, hydroelectric power, oil pipeline and electric rate programs.

Natural Gas Regulation

Under the Natural Gas Act (NGA), the FERC regulates the rates that interstate pipelines charge for the transportation and sale for resale of natural gas in interstate commerce. Certain natural gas producers also remain under FERC jurisdiction through rate and certificate regulation of approximately 50 percent of the total volume of gas produced. It is the Commission's duty to ensure that rates are just and reasonable. The Commission also administers the wellhead pricing program for natural gas established by the Natural Gas Policy Act (NGPA) of 1978. Construction and operation of pipeline facilities, and abandonment of existing facilities are reviewed by the Commission to determine whether it is in the public interest to approve certification or abandonment.

The FERC is requesting $45,174,000 in the natural gas regulation program. The request represents a decrease of $1,057,000 from the FY 1986 level.

The passage of the NGPA in 1978 marked the beginning of a new era in the natural gas industry. The phased decontrol of most wellhead prices, as provided in the Act, established a competitive wellhead market as a national policy goal. Phased or not, the industry's transition has been much less than smooth. Part of the difficulty derived from business practices that had been built up over a period of decades to deal with shortages and with a fragmented interstate/intrastate market system.

In only a few years, the industry moved from stable and tightly regulated markets at the wellhead, citygate, and burnertip to a phase where great uncertainty and greater competition existed. The natural gas industry and the Commission responded with a string of innovative proposals and programs. These include special marketing programs, discount programs, transportation programs, market retention programs -- all without precedent in the Commission's experience.

Against this background, in December of 1984, the Commission issued its three-phase Notice of Inquiry (NOI) on natural gas. The responses to this NOI were analyzed by staff, and on May 30, 1985, a Notice of Proposed Rulemaking (NOPR) was issued to address several regulatory policies that serve as the basis for proposed rules. The proposed rulemaking consisted of four parts: Part A--transportation; Part B--take-or-pay; Part C--optional, expedited certificates; and Part D--block billing. The final rule issued on October 9, 1985, as Order No. 436, adopted the first three parts with modifications. It provides that if pipelines choose to transport gas under the Commission's new program, they must do so on a nondiscriminatory basis. It also provides for an expedited procedure for obtaining Commission certificates for new facilities and services and expedited abandonment procedures. A final rule on Part D was postponed pending the filing of additional comments and the convening of a public conference.

The overall goal of the final rule is to adjust the FERC regulation of interstate transportation of natural gas to ensure that consumers are provided choices to obtain natural gas at market responsive prices. To bring this about, the changes are designed to allow efficient market principles to operate as much as possible within the statutory guidelines of the NGPA and the NGA.

Specifically, there are three major points in the Commission's regulatory changes contained in this final rule. A simplified transportation program is established which requires nondiscriminatory access. In addition, as a condition to authorizing transportation of gas for others, pipelines must offer their customers the opportunity to reduce their contract demands. Customers exercising this option will be able to choose more freely among service options offered by pipelines.

Second, the regulations provide for rate consideration of negotiated "buyouts" of future take-or-pay obligations, under limited circumstances. The rule also provides for the expedited processing of producer abandonment applications.

Third, a new optional expedited certification procedure is offered to pipelines willing to assume the risk of new ventures. Because pipelines would knowingly assume the risks involved, competing applications can be granted, allowing customers' choices under a more competitive market.

Finally, the proposed "block billing" portion was renoticed in Order No. 436 for additional comments. Under this proposal, a new two-part gas rate would be required which would remove from the competitive sphere below-market price-controlled gas, and would mitigate competitive distortions resulting from continued wellhead price controls. This procedure would allow all pipelines to compete for additional sales based on the current prices being paid for gas, free from the rolled-in effects of substantially lower prices of "old" gas. This proposed rule would be phased in beginning July 1, 1986.

Collectively, these changes are designed to allow consumers served by pipelines utilizing these new regulatory procedures to have greater access to more competitively priced natural gas through operation of market forces. This final rule and notice on block billing are not reactions to the immediate over-supply problem in natural gas markets; rather, they are intended to establish a long term regulatory framework which introduces more competition. The current situation results in a very large loss to the American economy in terms of net economic efficiency, a problem which can be mitigated by the introduction of competitive forces.

In addition to the Commission's block billing proposal that is intended to minimize the competitive distortions of gas prices controlled at below market levels, the Secretary of Energy has submitted a proposal to revise the ceiling rates established by the Commission for various categories of old, price-controlled gas. DOE's position is that legislative decontrol would be the best solution for problems created by the existing old gas pricing structure. However, in the absence of legislative decontrol, DOE feels that the Commission has authority to reform the old gas price control structure and the responsibility to ensure that these controls best serve the interests of consumers and producers.

Specifically, the Department of Energy's (DOE) proposal (RM86-3) would maintain price regulation for flowing old gas, but would simplify that scheme by establishing a single maximum lawful price equal to the highest ceiling price currently applicable. The proposal also requires the Commission to set incentive prices for old gas volumes that are recovered as a consequence of circumscribed circumstances. The Secretary has requested action on the proposal by June 1, 1986.

The Commission established a procedural schedule on December 20, 1985, to address DOE's proposed rulemaking. Comments are due to the Commission by February 25, 1986, with a public conference to be scheduled later.

The Commission expects to reduce pending workload by 23 percent from FY 1986 by completing 73,570 workload items in the natural gas area in FY 1987 while receiving 69,961 items. The major workload impact will be in the producer rate program with a projected 10 percent increase in receipts over FY 1985.

One of the most significant management initiatives the Commission has undertaken since its inception in 1977 is the development of an automated natural gas pipeline rate model. This model enables the Commission staff to analyze quickly in summary form the hundreds of pages of exhibits and schedules submitted with each rate filing by the 135 jurisdictional, interstate pipeline companies. Natural gas pipeline companies file rate increase applications about every 15 to 18 months. During FY 1986 and FY 1987 approximately 200 new filings will be received.

The model, which integrates mainframe and personal computer technology, permits staff to quickly calculate rates for interstate pipeline services. The new automated model has improved processing time and speeds the calculation of the pipeline cost of service. It also provides the flexibility to analyze a wide range of rate design methods used by the pipeline companies. As the number of filings that are entered into the computer system grows, the staff will be able to perform automated comparisons of previous filings and industry-wide allocations. Eventually, this will lead to the submission of machine-readable rate filings by applicants which should further improve productivity.

In the pipeline certificate area, the FERC is expecting additional prior notice and abandonment cases relating to increased transportation activity and reduced contract demand volumes. The FERC is also expecting increases in formal curtailment work due to contested revisions to curtailment plans. In addition, a large number of new certificate applications are being filed by pipelines to replace authorizations no longer available under the final rule. The producer program areas will experience some increases in filings because of increased abandonment activity resulting from the new rule in Order No. 436. The workload in the wellhead pricing program will remain stable.

Hydropower Regulation

The FY 1987 request is for $29,343,000, an increase of $1,353,000 from the FY 1986 level. At this request level, environmental studies are funded at $3.1 million; an increase of $1.2 million over FY 1986.

The hydropower licensing program has been the subject of four major court decisions over the past two years. Each of these decisions -- the Escondido, Tulalip, Yakima, and Clark-Cowlitz cases -- has had or will have a significant impact on the Commission's hydropower program.

The Supreme Court's Escondido decision rejected the view that the Commission retains exclusive conditioning authority over hydropower licensing, emphasizing instead that authority to impose reasonable licensing conditions for projects located within Federal reservations is dispersed among several Federal agencies. The Ninth Circuit's decision in the Tulalip case overturned the Commission's "natural water feature" rule, thus affecting a portion of the hydropower exemption program. The Yakima case, also decided by the Ninth Circuit, limited the Commission's use of "open-ended" license conditions to resolve project-related fish problems and requires the preparation of an environmental impact document prior to relicensing the project, even where the relicense application proposes no alteration of project operation. The Clark-Cowlitz case, decided by the U.S. Court of Appeals for the D.C. Circuit, rejected the Commission's decision in the Merwin Dam proceeding that municipalities do not have relicensing preference over the original licensee of the project. These decisions have necessitated a complete reconsideration of many long-held principles and assumptions underlying the FERC's hydropower licensing program. Recently, however, the Court vacated that decision and will issue a new decision after further briefing by the parties.

At the end of FY 1987 there will be 28 relicensing requests pending before the Commission. There are 49 licensed projects whose licenses will expire by the end of 1990; 26 of these expire by the end of 1987, while the balance will expire between 1988 and 1990. Since a licensee has three to five years before the expiration date to submit a relicensing application, many of those projects with licenses expiring in the late 1980's will have been covered by relicense applications submitted to the Commission during FY 1985 and FY 1986. It is anticipated that a number of competitive relicensing cases will eventually be set for hearing.

In the past several years the Commission has received an increased number of applications for preliminary permits, exemptions from licensing, and licenses. Some of these applications are concentrated in particular river basins, such as the Salmon in Idaho, the Snohomish in Washington, and the Owens in California. This concentration of pending proposals for hydropower development in several discrete areas is unprecedented. Environmental interest groups, Indian Tribes, Federal and state agencies, and others have filed pleadings concerning these basins contending that the proposed projects would have environmental effects that would be cumulatively, if not individually, significant.

In April 1985, the Commission implemented new procedures for assessing the cumulative environmental effects of the clustering of multiple hydropower projects within a defined river basin. The Commission directed staff to use a Cluster Impact Assessment Procedure (CIAP) to evaluate the potential for adverse environmental impacts resulting from multiple project developments within selected river basins. The CIAP can be utilized to identify basins where there is a potential for adverse environmental impacts from clustered hydropower projects. The CIAP consists of four phases, two sorting phases and two analysis phases. In the first sorting phase, a geographic sort will be undertaken to determine which proposed projects are located in a geographic area of concern within a river basin and to identify target resources. Secondly, in the resource sort phase, staff will determine whether any interactive relationship exists between proposed projects and target resources (e.g., anadromous fish migration). Those projects determined not to have an impact on the target resources would then be processed on a case-by-case basis.

The multiple project assessment phase will determine the potential for significant cumulative adverse impacts on target resources from proposed projects included in the CIAP. The fourth phase involves preparation of the National Environmental Policy Act (NEPA) document, which the FERC would consider in its evaluation of proposed projects for which impact assessments were performed during the third phase.

The result of using the CIAP approach on a particular river basin may be used by the Commission in several ways to ensure compliance with the requirements of the Federal Power Act (FPA) and the NEPA, and consistency with the Pacific Northwest Electric Power Planning and Conservation Act. Formal consolidation of all license applications for clustered projects and case-by-case licensing actions may both be viable alternatives, depending upon the results of the CIAP.

Initially, three river basins are being studied under the CIAP approach, the Snohomish in Washington, the Salmon in Idaho, and the Owens in California. The costs for these studies are estimated at $2 million during FY 1985 and FY 1986.

Three separate pieces of legislation have stimulated development of hydropower resources. The Energy Security Act provides a tax credit incentive for hydropower developers who have an application before the Commission by December 31, 1985. However, to qualify for this tax credit, developers must have their projects operational by December 31, 1988. As expected, developers filed a very large number of applications in the first quarter of FY 1986 in order to qualify for the tax credit. For example, preliminary permit applications during the first quarter increased by two-thirds over the same period in FY 1985 and amounted to almost 60 percent of the current estimate for all of FY 1986. Also, minor new capacity filings during the first quarter exceeded 50 percent of the total estimate for FY 1986. The Commission must process all applications in a timely manner to allow developers enough time for construction. The Crude Oil Windfall Profit Tax Act of 1980 provides a tax credit to the developers whose applications have been received by December 31, 1985, and who have construction financing arranged by December 31, 1988. The Economic Recovery Act of 1981 provides developers with a more generous depreciation allowance commencing in 1985 and continuing for future years. FY 1986 could be the peak year for applications seeking to develop hydropower projects.

The Commission has attempted to maximize its resource utilization under these circumstances by improving staff productivity and streamlining the licensing process; for example, the Office of Hydropower Licensing has developed a handbook for project managers that will train new project managers and assist current managers in the flow of applications through the Hydropower Licensing Program.

In response to the growing interest in hydropower development in the Northwest, the Commission opened a new regional office in Portland, Oregon, on November 1, 1985. The Portland office will be responsible for inspecting operating projects as well as those under construction in the States of Washington, Oregon, Idaho, Wyoming, Montana, and Alaska. In addition, the Commission realigned project responsibilities for the San Francisco, Chicago, and Atlanta Regional Offices and closed the regional office in Fort Worth, Texas. These changes will ensure more effective utilization of Commission resources and will provide increased responsiveness to licensees and the public throughout the United States.

It is anticipated that pending workload will decrease by 15 percent or 187 items from FY 1986 to FY 1987. In FY 1987, the Commission will complete 1,736 hydropower licensing workload items while receiving 1,549.

With respect to the Dam Safety Inspection Program, the workload, as specified by the FPA, has increased significantly as a result of the large number of licenses issued for new capacity hydroelectric projects. For example, between FY 1981 and FY 1984 the number of construction inspections increased 103 percent. This rate of increase is leveling off, but the inspection workload is continuing to increase. In FY 1987 the Commission plans to complete 1,788 dam safety inspections.

Oil Pipeline Regulation

The FY 1987 request is $4,139,000, an increase of $357,000 from the FY 1986 level to fund increased formal rate activity resulting from the Commission Opinion 154-B in the Williams Pipe Line Company case. The FERC must ensure that the rates of pipelines transporting oil in interstate commerce are just and reasonable. A total of 1,597 workload items will be processed in FY 1987, and the pending workload at the end of the year will total 422 items.

The Commission regulates oil pipeline companies engaged in interstate commerce in order to ensure just, reasonable, and nondiscriminatory tariffs. Oil pipelines are the most efficient, least costly means of transporting oil. The investment associated with the 174,000 miles of regulated interstate petroleum pipelines is approximately $17.4 billion.

A significant workload item in the oil pipeline regulation program is the Commission's review of Department of Energy (DOE) remedial orders and review of adjustment request denials. These items are appeals by companies of Office of Hearing and Appeals decisions regarding alleged violations of mandatory petroleum price and allocation regulations and often involve millions of dollars. In FY 1985, the responsibility for conducting hearings to process these appeals was transferred from the Office of the General Counsel to the Office of Administrative Law Judges. This transfer was made to expedite the processing of these items within the Commission.

On June 28, 1985, the Commission issued a final Opinion No. 154-B in the long-standing Williams Pipe Line Company ratemaking case. The order provided for a new rate base methodology requiring a transition rate base and rates based on trended original cost as compared to the earlier ICC valuation method. Through the issuance of this opinion the Commission has established a methodology which it will apply to test the reasonableness of oil pipeline rates on a case-by-case basis to determine whether the end result is just and reasonable. The Williams case has been in litigation since 1972, and the implementation of the order will require additional staff effort in the formal pipeline rate area to analyze these filings on a case-by-case basis. A significant increase in audit work is also required. Pending workload is expected to nearly double from FY 1985 to FY 1987.

Electric Power Regulation

In FY 1987, the Commission is requesting $20,423,000, a reduction of $426,000 from the FY 1986 level. With this level of resources the Commission will complete action on 1,758 workload items leaving 430 workload items pending, or an 11 percent reduction from FY 1985.

The FPA requires the FERC to establish just and reasonable rates for wholesale electric sales and transmission of electric energy in interstate commerce. The wholesale sales transactions regulated by the FERC are divided into two distinct categories, requirement sales and coordination sales. Requirement sales involve a long-term commitment to provide firm power to meet all or part of the buyer's load. Coordination transactions, on the other hand, involve the sale or exchange of electricity between utilities that normally have sufficient generation to meet their own loads. Coordination sales generally are for a shorter time duration and less firm than requirement sales. The volume of coordination sales has grown significantly.

Over the past two years the Commission has initiated several actions that broadly affect the electric utility industry. In the summer of 1983, the Commission changed its treatment of construction work in progress (CWIP) in setting utility rates. The effects of that policy change are reflected in the wholesale rate applications of utilities that still have an active construction program. However, the U.S. Court of Appeals for the District of Columbia Circuit recently vacated and remanded the CWIP rule in the Mid-Texas Electric decision; the Commission is now reviewing the decision.

In another action, the Commission recently concluded the first annual generic rate of return proceeding under which an initial benchmark rate of return of 14.44 percent was established for the industry. The benchmarks will be updated quarterly and will be advisory for the first two years they are effective; they will become presumptively applicable to all rate filings beginning with the third year. In the most recent quarterly update, the benchmark return was set at 13.68 percent for filings made during the period of November 1985 through January 1986.

These new generic procedures will enable the Commission to respond better to rapidly changing capital market conditions and, for the first time, will create a national forum for evaluating annually the financial condition of the electric utility industry. In addition to these significant steps, the Commission has also developed other innovations, such as new fuel clause regulations and a wheeling experiment in the Southwest involving six utilities in three states designed to encourage efficiency and, therefore, lower costs in the electric power industry.

Because power purchased at wholesale is becoming more important as a source of supply for the electricity delivered to the ultimate consumers, the Commission has issued an NOI concerning its present policies regarding wholesale electricity transactions and transmission services. The Commission wants to determine whether its current policies either promote or impede efficiency in electricity markets and whether there are any alternatives to help those markets operate more efficiently. This is a two-phase inquiry: Phase I seeks comments on coordination transactions and transmission services; and Phase II will focus on requirements services.

Because the Commission directly regulates almost 30 percent of all electricity either sold or exchanged in the country, the effect of its regulatory policies and actions is eventually felt in practically all end-use rates. This makes it extremely important that these policies and actions and any changes thereto reflect changing conditions and serve the interests of the consumer, as well as the industry. The Notice of Inquiry will lay the foundation for any future action the Commission may propose.

The Commission has taken steps to improve processing of formal electric rate cases. In passing Rule 717, the FERC established procedures for routine cases in which a presiding administrative law judge can reconsider aspects of his initial decision before the parties raise their objections to the Commission. This is intended to speed-up the process by allowing the judges to correct errors identified by the parties. In conjunction with Rule 717, the Chief Administrative Law Judge also has placed about half of the designated Rule 717 cases under so-called "fast track" schedules. The overall objective of the reconsideration procedures and the expedited scheduling is to process routine formal rate cases in 52 weeks or less.

The Commission also has significant responsibilities relating to cogenerators and small power producers. It certifies whether particular cogenerators or small power producers qualify under the Public Utility Regulatory Policies Act (PURPA) of 1978 for certain incentive treatments in dealing with public utilities. As of September 30, 1985, the FERC received almost 2,000 filings for qualification with a total capacity of 21,648 megawatts. In determining an applicant's qualification for cogenerator or small power producer status, the Commission is receiving more sophisticated applications as understanding of the opportunities afforded under PURPA increases. Inclusion in recent applications of issues such as the use of new waste energy forms and ownership criteria is contributing to the increased complexity of the applications.

Many complex issues affecting the electric utility industry will have to be addressed in FY 1987, such as least-cost supply options, pricing methods, and efficiency in the bulk power markets. The resolution of these questions is vital to the future health and welfare of the industry and the consumers that it serves.

Fee Revenue

Included in the Commission's FY 1987 budget request is the assumption that the annual charges legislation transmitted to Congress on May 8, 1985, will be enacted during FY 1986. The legislation should make clear the Commission's authority to reduce the costs of energy regulation to the taxpayer by recovering a greater share of FERC's costs from energy companies that operate under Commission license or authorization. While this is currently done under the authority of the Federal Power Act in the hydropower program, the new legislation would give the Commission comparable authority over natural gas companies, electric utilities, and oil pipelines. In addition, beginning in FY 1986, the Commission will include in the annual charges billed to licensees those costs incurred by other Federal agencies for administering Part I of the Federal Power Act. These other agency costs are estimated to be $2.3 million for FY 1986.

Accordingly, revenue estimates for FY 1987 total $78.8 million, off-setting 80 percent of the Commission's operating costs. This represents an increase of $29.3 million in revenue over the FY 1986 level, an increase of 59 percent. It should be noted that the Commission's existing authority to collect fees during this period, except for annual charges and headwater benefits in the hydropower program, is being challenged in litigation in the U.S. Court of Appeals for the Tenth Circuit, in Phillips Petroleum Co., v. FERC. The chart below depicts revenue estimates from FY 1984 through FY 1987.

Fee Revenue
(Dollars in millions)

	FY 1984 Actual	FY 1985 Actual	FY 1986 Estimate	FY 1987 Estimate
Existing Authority	$39.9	$42.8	$49.5	$52.3
New Legislation	.....	.....	.....	$26.5
Total Applied to Appropriation	$39.9	$42.8	$49.5	$78.8
Other Revenues:				
Headwater Benefits	4.4	3.9	10.5	7.5
Other Payments	4.3	7.4	7.8	7.8
Total Collections	$48.6	$54.1	$67.8	$94.1

By FY 1988 the additional revenue attributable to the new annual charges legislation should be approximately $50,000,000 annually.

Management Initiatives

The FY 1987 budget request represents a current services level of operations. With the assumption of the passage of the proposed fee legislation, coupled with the Commission's continuing efforts to reduce average grade and the cost of maintaining operations, the FERC would be able to reduce its net cost to the Treasury by 59 percent between FY 1986 and FY 1987.

Management initiatives will allow FERC to absorb the inflation in administrative accounts and part of the costs of increased environmental studies efforts. Productivity improvements will allow the FERC to reduce pending workload levels by 21 percent from FY 1986 while processing an increasingly complex workload. These efforts on the part of FERC management reaffirm the Commission's commitment to reducing the costs of government while fulfilling its statutory mandates.

Cost savings have been made in printing by eliminating some service lists for Commission documents and also reducing the number of interested parties on the remaining lists ($100,000); eliminating the printing of the 50,000 jurisdictional agency determination filings in the Federal Register ($350,000); contracting with GPO for the FERC Statutes and Regulations rather than performing this task inhouse ($250,000); purchasing word processing and computer equipment to avoid future lease costs ($1,000,000); using "boilerplate" language in Federal Register notices ($100,000); discontinuing the library services contract ($277,000); improving management controls of FTS long-distance calls ($300,000); and establishing fees for employee parking to reimburse the FERC for costs included in building rent ($100,000). These specific cost savings along with other non-cost improvements such as better space management, office reorganizations, staff productivity, reduction in average grade, and controls on hirings and promotions are the result of top management's continued efforts to review and assess the many and varied functions required to support the Commission's staff.

Productivity

The FERC achieved a 20 percent increase in staff productivity in FY 1984 and a 7 percent increase in FY 1985. Productivity goals are a part of the Commission's Senior Executive Service performance plans. The Commission's goal is to achieve an annual average of 5 percent productivity improvement for FY 1986 and FY 1987.

Top management takes a direct interest in monitoring workload performance. For example, program managers meet with the Executive Director monthly to report on progress in processing their workload. During these meetings each of the 140 workload categories is reviewed, problems are identified and discussed, and decisions and assignments are made to ensure that year-end goals are met. In addition, quarterly meetings are held to address the productivity trends in each program and to solve problems and reallocate resources as necessary.

Conclusion

The business environment in which natural gas, hydropower, and electric utilities operate today is very different from what it was only a few years ago. In the past two years, more innovation has occurred in the way natural gas and electricity are bought and sold than in the last twenty years, and it is continuing to change. As a regulator of these businesses, the Commission has an obligation to ensure that its regulatory practices keep abreast of those changes.

The Commission has taken major first steps in the process of reviewing and rethinking its approaches to promoting the public interest for consumers, investors, and the economy at large. Challenging, yet timely, questions have been raised, and the Commission has proposed a comprehensive package addressing key energy issues. The Commission has before it a unique opportunity to take up those challenges, and to strike a more durable and beneficial balance among the competing economic forces in the natural gas, hydroelectric, and electric industries. This budget request contains the minimum resources to ensure that the Commission continues to play a vital role in this process.

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

Summary of Receipts

	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986 Projected	FY 1987 Projected
NATURAL GAS REGULATION	69,900	72,118	73,821	68,026	70,131	69,961
Pipeline Certificate	1,067	909	1,094	1,235	1,249	1,264
Pipeline Rate	1,894	2,214	2,890	3,785	3,748	3,633
Producer Certificate	931	1,046	1,160	967	965	915
Producer Rate	3,666	3,368	2,484	1,556	1,734	1,719
Administration of Wellhead Pricing	62,342	64,581	66,193	60,483	62,435	62,430
HYDROPOWER REGULATION	3,477	3,235	3,452	3,879	3,434	3,337
Hydropower Licensing	2,052	1,650	1,805	2,158	1,696	1,549
Dam Safety Inspections	1,425	1,585	1,647	1,721	1,738	1,788
OIL PIPELINE REGULATION	3,795	2,079	1,272	1,027	1,509	1,573
ELECTRIC POWER REGULATION	1,521	1,581	1,644	1,937	1,727	1,745
TOTAL RECEIPTS	78,693	79,013	80,189	74,869	76,801	76,616
LESS--Jurisdictional Agency Determinations	57,192	57,805	51,395	47,973	50,000	50,000
	21,501	21,208	28,794	26,896	26,801	26,616

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

Summary of Completions

	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986 Projected	FY 1987 Projected
NATURAL GAS REGULATION	69,227	73,123	71,464	69,732	73,322	73,570
Pipeline Certificate	1,118	879	1,054	1,219	1,283	1,291
Pipeline Rate	1,823	2,177	2,790	3,626	3,757	3,662
Producer Certificate	1,042	1,051	1,132	1,043	990	940
Producer Rate	4,247	3,526	2,851	1,808	1,835	1,747
Administration of Wellhead Pricing	60,997	65,490	63,637	62,036	65,457	65,930
HYDROPOWER REGULATION	3,547	3,172	3,475	3,933	3,478	3,524
Hydropower Licensing	2,122	1,587	1,828	2,212	1,740	1,736
Dam Safety Inspections	1,425	1,585	1,647	1,721	1,738	1,788
OIL PIPELINE REGULATION	2,697	4,599	1,297	1,111	1,279	1,597
ELECTRIC POWER REGULATION	1,685	1,643	1,662	1,981	1,767	1,758
TOTAL COMPLETIONS	77,156	82,537	77,898	76,757	79,846	80,449
LESS--Jurisdictional Agency Determinations	54,760	59,429	53,689	47,777	50,000	50,000
	22,396	23,108	24,209	28,980	29,846	30,449

Federal Energy Regulatory Commission
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Summary of Pending Workload

	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986 Projected	FY 1987 Projected
NATURAL GAS REGULATION	18,795	19,468	18,463	20,820	19,135 1/	15,944	12,335
Pipeline Certificate	542	491	521	561	577	543	516
Pipeline Rate	438	509	546	646	826 1/	817	788
Producer Certificate	382	271	266	294	218	193	168
Producer Rate	1,743	1,162	1,004	637	385	284	256
Administration of Wellhead Pricing	15,690	17,035	16,126	18,682	17,129	14,107	10,607
HYDROPOWER REGULATION	1,385	1,315	1,378	1,355	1,301	1,257	1,070
Hydropower Licensing	1,385	1,315	1,378	1,355	1,301	1,257	1,070
Dam Safety Inspections	-0-	-0-	-0-	-0-	-0-	-0-	-0-
OIL PIPELINE REGULATION	1,744	2,842	322	297	216 1/	446	422
ELECTRIC POWER REGULATION	735	571	509	491	483 1/	443	430
TOTAL PENDING WORKLOAD	22,659	24,196	20,672	22,963	21,135	18,090	14,257
LESS--Jurisdictional Agency Determinations	6,314	8,746	7,122	4,828	5,024	5,024	5,024
	16,345	15,450	13,550	18,135	16,111	13,066	9,233

1/ Reflects a total increase of 60 in pending workload at start of FY 1985 for financial audits due to change in internal processing procedures.

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

NATURAL GAS REGULATION

Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
Natural Gas Regulation			
Pipeline Certificate - Operating Expenses	$15,157	$15,243	$14,767
Pipeline Rate - Operating Expenses	19,688	19,257	19,560
Producer Certificate - Operating Expenses	2,452	2,546	2,330
Producer Rate - Operating Expenses	2,112	2,516	2,460
Administration of Wellhead Pricing - Operating Expenses	7,580	6,669	6,057
Natural Gas Regulation - Total Operating Expenses	$46,989	$46,231	$45,174
Staff Years	820	808	802

Authorization:

Natural Gas Regulation:	Natural Gas Act; Natural Gas Policy Act; Alaska Natural Gas Transportation Act; Public Utility Regulatory Policies Act; Department of Energy Organization Act; Outer Continental Shelf Lands Act; Energy Security Act; Regulatory Flexibility Act; Crude Oil Windfall Profit Tax Act; National Environmental Policy Act; National Historic Preservation Act.

Goals of the Natural Gas Regulation Program:

- Ensure that all rates and conditions of service for the sale and transportation of natural gas in interstate commerce are in compliance with the applicable statutory mandates.

- Establish regulatory policies that will assist the industry and the public in adjusting to the phased removal of wellhead price controls pursuant to the Natural Gas Policy Act (NGPA) of 1978.
- Institute and administer review and data collection procedures adequate to provide the Commission, the public, and the Congress with the regulatory information necessary to evaluate developments in the industry.
- Evaluate the impact of the NGPA and NGA on current and projected natural gas markets, including market ordering problems associated with the partial decontrol of wellhead pricing.

Specific Objectives for FY 1987:

- Give priority to energy-critical cases.
- Complete implementation of the final rule in order No. 436.
- Carry out all the requirements of the NGPA.
- Ensure that gas remaining subject to the NGPA is sold in compliance with statutorily established prices.
- Expedite formal casework to minimize the collection of unjust or unreasonable rates.
- Authorize the construction and operation of pipeline facilities in a manner that will provide for the most economic and efficient transportation and/or delivery and sale of natural gas.
- Continue to monitor programs designed to enable market forces to operate for decontrolled gas.
- Administer gas curtailment plans and cases.
- Provide means for the transportation of natural gas incident to various competitive market situations.
- Administer production-related cost and special relief programs to encourage maintenance of a sufficient supply of gas.
- Reduce case processing time and regulatory burden through blanket certificates, generic proceedings, reduced and more uniform reporting requirements, delegations of authority, and computer and other automated support.
- Administer the Uniform System of Accounts and a program of financial audits.
- Perform all environmental and reliability analyses on a timely basis.
- Assure the availability and quality of information required for regulatory monitoring of the gas industry as it moves toward a more competitive environment.
- Perform import and export responsibilities as delegated by the Secretary of Energy.

Productivity Standards:

- Decrease pending workload by 3,609 items or 23 percent from FY 1986.

Under this program the Commission is responsible for the regulation of more than 9,700 natural gas producers and about 150 natural gas pipelines. The function of the program is to ensure the lowest reasonable rates for the sale and transportation of natural gas consistent with safe and reliable long-term service. Under the Natural Gas Act (NGA) of 1938, the Commission regulates the transportation and sale for resale of natural gas in interstate commerce by issuing certificates of public convenience and necessity for the construction and operation of facilities and setting rates for such services.

Under the NGPA of 1978, the Commission's jurisdiction was expanded in part by requiring the Commission to administer various ceiling prices for certain categories of natural gas production in interstate and intrastate commerce. Staff performs audits to ensure that producers properly vintage and price their gas under various NGPA categories to protect residential and small commercial and industrial consumers from the impact of unlawfully high prices. The Commission works closely with state regulatory authorities to ensure full and proper implementation of the NGPA.

The NGPA of 1978 also requires that the Commission implement procedures that permit sale, transportation, and assignment of natural gas by intrastate pipelines. These procedures have been implemented and have resulted in the movement of substantial volumes of gas from traditional intrastate markets to interstate markets, thus increasing competition and adding substantially to the workload of the Commission.

Under the NGPA of 1978, pipeline curtailment priorities were altered significantly. Specifically, the Act provided that interstate gas deliveries needed for certain essential agricultural and industrial uses generally would not be curtailed unless gas was needed to serve higher priority users. As a result, the FERC has required the pipeline companies to adjust their curtailment plans annually, even when no curtailment is anticipated, to reflect the current requirements of the agricultural users. Furthermore, changes in supply and demand configurations require thorough investigations to ensure protection of these high priority customers.

Under the DOE Organization Act, all functions dealing with the regulation of the import or export of natural gas were vested in the Secretary of Energy. A portion of this responsibility--namely, the approval of the construction and operation of facilities and approval of the point of entry where new facilities are required--has been delegated to the Commission, along with the responsibility for related applications to construct and operate the associated jurisdictional facilities and the delivery and sale of the natural gas in interstate commerce.

On January 1, 1985, certain categories of gas were decontrolled. This required several changes to the Commission's regulations which were implemented in Order No. 406 issued on November 16, 1984. In general, this order reaffirmed the need for the filing of jurisdictional agency determinations for certain gas to be deregulated, provided for interim collections by the producer at deregulated prices, clarified the fact that gas qualifying for a deregulated price category as well as a regulated price category would be deregulated and indicated that any intrastate gas contract would be considered deregulated if the contract prices were above $1.00/MMBtu on December 31, 1984. In FY 1986, the Commission may continue to experience the effects of the current market conditions of oversupply. If current market conditions continue, it is anticipated that producer filings, for both certificates and rates, over the long run will decline. Short term increases are expected however as a result of Order No. 436 which is discussed in detail below.

The decline in gas demand and the market disorder associated with partial decontrol have created severe economic pressures for producers, pipelines and end users alike. The rigidity of FERC regulation of interstate pipelines under the Natural Gas Act and the inflexibility of the industry's long-term contract structure combined to aggravate these pressures. Special Marketing Programs (SMPs) and blanket certificates were developed jointly by the industry and the FERC as ways to deal with these pressures. They became vehicles to move additional supplies of gas. Producers who faced the shutting in of gas supplies and loss of cash flow tried to increase gas flows at lower prices.

On May 10, 1985, the Court of Appeals of the D.C. Circuit overturned as unlawfully discriminatory the blanket certificate transportation program which applied to industrial end-users and remanded for consideration all special marketing programs. On August 6, 1985, the Court found the SMP II Program unlawfully discriminatory as well, but agreed to allow it to operate until October 31, 1985, the expiration date that the Commission had previously established. The uncertainty created by the Court's decision may be alleviated by Order No. 436 which adopts sweeping revisions to natural gas regulations.

Implementation of Order No. 436, issued on October 9, 1985, in part--although the block billing portion is still subject to public comment--is designed to deal with the changing market conditions. Under the final rule, the general policy provides for nondiscriminatory access to transportation; thus, any pipeline that carries natural gas owned by other companies would have to transport gas to any other company on a nondiscriminatory basis. This is expected to expand significantly the spot market for direct gas purchases by users from producers and to increase competition at the city gate. It would also increase flexibility in offering new service where companies are willing to accept the costs and associated risks. Further, it establishes appropriate levels of company accountability and adjusts prior service agreements and obligations by permitting customers to reduce existing sales entitlements or convert them to transportation. The block billing rule is designed to remove remaining distorting effects of prior price controls and establish regulations that are appropriate under rising as well as falling commodity prices. The effect of the rule which is to be implemented by July 1, 1986, should encourage competition in the market place and give incentives for producers, distributors and industrial customers to make their own sales and transportation arrangements. Pipelines would also be granted pre-abandonment and incentives under certain project assumptions provided transportation services are made available on a nondiscriminatory basis. The impact on the natural gas programs of enactment of Order No. 436 is very broad and pervasive.

In the producer work categories, shifting from sales to transportation transactions will result in an increase in abandonments and certificate applications where producers opt to take their gas and sell it to another purchaser.

On November 19, 1985, the Secretary of Energy submitted a proposed rulemaking (RM86-3-000) to the Commission for consideration. The Secretary proposed that the Commission, under sections 104 and 106 of the NGPA establish just and reasonable prices for "flowing" old gas to eliminate vintaging and replace the current myriad of old gas ceiling prices with a single ceiling price (the ceiling price for post-1974 gas). The Secretary also requested that the Commission establish, in accordance with section 107 of the NGPA, incentive prices for certain categories of old gas, in order to increase significantly the production of old gas and to encourage long-term investment in natural gas exploration, development, and production. Under DOE's proposal, a producer would receive a price higher than the current price only if a purchaser agreed to the higher price. The Secretary requested that the Commission take final action on this proposal by June 1, 1986. On December 20, 1985, the Commission established a procedural schedule for addressing the proposed rulemaking issued by the Secretary. Comments are due to the Commission by February 25, 1986. A public conference on the rule will be scheduled later.

In the pipeline certificate categories, Order No. 436 is expected to have even greater impact and cause greater surges in workload. First, interstate pipelines will apply for new blanket transportation certificates to replace those which expired on October 31, 1985. Second, pipelines will make filings under the new optional procedure wherein the company agrees to assume financial risk. Those filings as well as the increasing competition among industry components will undoubtedly increase formal construction and operation proceedings as opposition is voiced to these projects and transportation arrangements by 3rd party protestants. Transportation applications filed under section 7(c) of the NGA may increase to the extent that interstate pipelines choose not to be transporters under Order No. 436. Several industry groups that would have an advantage under open access provisions of the new rule have indicated that they intend to protest all section 7(c) transportation applications as being an attempt to subvert the intent of Order No. 436. Third, prior notice filings will increase as the new blanket transportation certificate program expands eligible sources of supply and requires prior notice applications for proposed new or changed delivery points. Abandonment filings will increase to the extent pipelines opt to reflect reductions in customers sales entitlements. Lastly, the new rules will result in curtailment filings for transportation transactions. This could result in basic changes in all existing curtailment plans with the likelihood of opposition leading to an increase in formal curtailment proceedings.

In the pipeline rate area, the proposed two-tier billing mechanism to protect pricing of old gas will pose new auditing and filing analysis requirements relating to PGA filings. It is expected that many will be challenged by affected parties and will lead to additional formal proceedings. Under RM85-1, interstate pipelines must initially revise their tariffs, service agreements, and then file new tariffs if they elect optional transportation service. This will affect certificated rate filings.

Further, pipeline rate filings under Section 4(e) of the NGA will be more complex, and it may take considerably longer to process these nonformal rate changes. Where interested parties contest these filings, they will be set for formal hearing and thus lead to an increase in formal rate change cases in FY 1986. Moreover, implementation of RM85-1, which proposes to require interstate pipelines to bill costs under a new two-tier pricing system, would require revisions to FERC regulations and processing procedures for nonformal rate change tracking filings in order to track gas costs separately. This two-tier tracking will, if adopted, require development of a new accounting system as well. The only reduction of pipeline rate filing workload that is likely to occur will be in the Transportation Transactions category where RM85-1 removes certain reporting requirements. However, increased filings are expected as a result of a revised blanket certificate program and expanded eligiblility under Section 311(a) of the NGPA. Pipelines will have to make cash refunds under RM85-1 which will more than double the receipts and completions in the refund workload.

Price decontrol will have the effect of increasing the complexity of pipeline certificate and rate matters. While pipeline companies that have adequate supplies will be adjusting to price decontrolled supplies, producers are expected to attempt to sell their gas supplies directly to end-users and request the pipeline companies to transport the gas. As a result, requests for certificates and rates are more likely to be contested as more competition takes place in the industry. In FY 1987, the Commission expects to complete 73,570 workload items while receipts are estimated to be 69,961. Table 1 shows the level of receipts and completions for the five programs comprising natural gas regulation, while Table 2 shows workload pending at the end of the fiscal year.

Table 1 - Total Natural Gas Workload

	Receipts			Completions		
	FY 1985	FY 1986	FY 1987	FY 1985	FY 1986	FY 1987
Pipeline Certificate	1,235	1,249	1,264	1,219	1,283	1,291
Pipeline Rate	3,785	3,748	3,633	3,626	3,757	3,662
Producer Certificate	967	965	915	1,043	990	940
Producer Rate	1,556	1,734	1,719	1,808	1,835	1,747
Administration of Wellhead Pricing	60,483	62,435	62,430	62,036	65,457	65,930
Total	68,026	70,131	69,961	69,732	73,322	73,570

Pending workload at the end of FY 1987 is estimated to be 12,335. When compared to the FY 1985 pending of 19,135 this represents a decrease of over 35 percent.

Table 2 - Workload Pending at End of Fiscal Year

	FY 1984	FY 1985	FY 1986	FY 1987
Pipeline Certificate	561	577	543	516
Pipeline Rate	646	826 1/	817	788
Producer Certificate	294	218	193	168
Producer Rate	637	385	284	256
Administration of Wellhead Pricing	18,682	17,129	14,107	10,607
Total	20,820	19,135	15,944	12,335

1/ Reflects increase of 21 in pending workload at start of FY 1985 for financial audits due to a change in internal processing procedures.

Natural Gas Regulation FY 1987 Request

The Commission is requesting $45,174,000 in FY 1987, for the natural gas program. The FY 1987 projection of natural gas workload receipts is 69,961, almost 2,000 more than the FY 1985 level. At the same time, completion levels will increase by almost 4,000 from FY 1985 to FY 1987.

Although the January 1, 1985, price decontrol of 40-50 percent of the existing natural gas supplies has been raised as a factor in natural gas workload, the impact of Order No. 436 has reversed at least for the short run the decline in overall workload. In summary, increases and shifts in the FERC workload will be influenced more by the health of the economy, market conditions, and Order No. 436 than by the effects of price decontrol. Therefore, as the Commission traverses this unsettled period in the transition to a more competitive market, every effort will be made to monitor closely changing conditions in order to provide a swift and appropriate response through either the reallocation of staff or regulatory remedies.

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
Pipeline Certificate Regulation: Operating Expenses	$15,157	$15,243	$14,767

Goals of the Pipeline Certificate Program:

- Ensure that adequate gas transmission capacity is provided at reasonable rates to ensure reliability of service.
- Ensure compliance and enforcement of Commission rules, regulations, and orders.
- Fulfill the objectives of the NGPA by providing for the protection of high priority uses of natural gas.
- Monitor and review programs governing the transportation of natural gas in both interstate and intrastate markets in anticipation of increasing demand for natural gas transportation services.
- Encourage competition within the natural gas industry with respect to both supply and markets.

Specific Objectives for FY 1987:

- Expedite processing of energy-critical projects.
- Complete implementation of Order No. 436.
- Reduce regulatory burden and streamline case processing.
- Reduce pending workload by 61 items, a decrease of 11 percent from FY 1985, through increased use of automation and other productivity measures.
- Facilitate the movement of gas as necessitated by supply and market conditions through both the construction and operation of additional capacity and utilization of existing facilities, when available, through transportation arrangements.
- Increase use of ADP techniques to monitor and enhance review of transportation programs.
- Develop policies to respond to changes in pipeline operations resulting from the decontrol of certain wellhead prices.
- Ensure operational reliability for Liquefied Natural Gas (LNG) facilities.
- Evaluate factors affecting both current and future market requirements.
- Revise curtailment plans as required by the NGPA to reflect changes in market configurations that result from increased competition under Order No. 436.
- Expedite processing of filings wherein the industry agrees to accept the financial risk associated with providing services for new markets.

Certificate Applications

Natural gas pipelines transport natural gas from the various production areas to markets throughout the country. The pipeline industry comprises an underground pipeline network of more than one million miles in length. A major component of this system is the 267,000 miles of large diameter transmission facilities which move gas in interstate commerce over long distances to markets in 47 states. These transmission facilities represent an original investment exceeding $30 billion. Over 25 percent of the Nation's annual energy consumption is currently moved to its point of utilization by this pipeline network.

Interstate natural gas pipeline companies apply for certificates for transportation and sale of natural gas for resale in interstate commerce and for the construction and operation of pipeline facilities.

During the deliberations that led to passage of the NGA, it was generally recognized that interstate gas pipelines were not primarily transporters of natural gas for others. More typically, they were gas marketers because they purchased gas in the field, transported it to market, and sold it at wholesale to distribution companies. The Congress did not identify them as common carriers nor did it impose upon them common carriage obligations. As originally promulgated, the NGA imposed upon the Commission the obligation to assure that rates and charges were just and reasonable; it also required the Commission to determine the public interest where one pipeline proposed to serve a market already being served by another pipeline. Essentially, it was the Commission's responsibility to determine whether and to what extent the competition involved in the proposal was in the public interest.

Historically, the Commission has made these determinations by requiring that certificate applications be accompanied by showings on such matters as: (1) availability of an adequate gas supply; (2) potential markets to be served; (3) adequacy of facilities to be constructed; (4) estimated cost and financing arrangements; and (5) projected rates and revenues. In February 1942, the NGA was amended to require certificate authorization for the construction and/or operation of interstate pipeline facilities regardless of whether these facilties were involved in competition for the same markets. Congress had concluded that effective rate regulation required a review of construction projects prior to the construction taking place. Pursuant to this congressional intent, the Commission has historically encouraged competition among pipelines so long as it resulted in the lowest reasonable rates consistent with reliable service. In February 1984, the American Gas Association released a study on competition in the natural gas industry which found that most of the major markets are served by more than one pipeline supplier. The Commission has implemented certain programs designed to encourage further competition. The Commission's Order No. 380 regarding minimum commodity bills, subsequently affirmed on judicial review, provides greater flexibility for most large pipeline customers to "shop around" for the most competitively priced gas. Special marketing programs were approved on an interim basis through October 31, 1985, for both pipelines and producers. Blanket certificates for end-user transportation were also in effect until October 31, 1985. These experimental programs were designed to enable producers to sell gas in markets previously served exclusively by pipelines and distributors. The final rule in RM85-1 provides for transportation arrangements on a nondiscriminatory basis to enable even greater competition between gas industry segments.

The blanket certificate program was developed for less controversial proposals and streamlined the regulatory process through its self-implementing feature, which reduced the number of pipeline certificate applications that would otherwise be handled on a case-by-case basis, and by its prior notice procedure which expedited processing through reduction of filing requirements, internal reports, and staff review. While blanket procedures have simplified filings, the complexity of applications not qualifying for prior notice procedures will require more staff time to process, particularly in the initial phase of implementation of RM85-1 during FY 1986 and FY 1987.

Certificate filings which are beyond the scope of the blanket certificate program and do not come within the blanket aspects of the new rule will be analyzed and processed in accordance with applicable regulatory rules and judicial procedures which require individual public interest determinations concerning the proposed construction of new facilities, the operation of existing facilities, the acquisition of facilities, or the abandonment of facilities or services.

On May 25, 1984, a final rule was issued (Order No. 380) which eliminated variable costs from the minimum bills of interstate pipelines. This rule assists distributors in seeking a least-cost mix of supplies and enhances competition among pipelines. The increased competition has generated certificate applications to attach additional supplies and expand markets. It will also generate opposition as well as challenges to long-term reliability of service. Thus, fiscal years 1986 and 1987 are expected to have a higher number of contested cases than FY 1985.

In addition, as discussed above, the Commission issued Order No. 436 in docket No. RM85-1, that should increase competition within the natural gas industry. These regulations provide for: (1) broader access for shippers and consumers to transportation services offered by pipelines, including the option for sales customers to reduce contract entitlements by up to 15 percent in the first year or convert such entitlements to transportation; (2) expedited consideration of producer abandonment certification where the "buy-out" of current "take-or-pay" contracts by pipelines is involved; and (3) optional expedited certificate procedures for pipelines willing to accept the whole risk of new ventures. In addition, the Commission Order No. 436 reissued for comments a proposed billing mechanism that recognizes the need to reflect the cost of newly acquired gas in the competition for new customers and markets.

Alaska Natural Gas Transportation System

The Alaska Natural Gas Transportation Act of 1976 requires priority consideration of all applications relating to the Alaska Natural Gas Transportation System (ANGTS) in order to expedite regulatory approval of the project. Currently, the application for the Alaskan portion of the ANGTS is still pending before the Commission, primarily because the applicants have announced a lengthy delay in submitting their financial plan. Because of this delay, the staff assigned to the project were reassigned to other areas. Only a minimal amount of staff effort will continue to maintain information that will allow the Commission to respond expeditiously when the applicant finally submits the financial plan, now expected to be filed sometime after FY 1986. The extent of activity at such time will be consistent with the formal hearing requirements, since the final certification has been set for hearing but held in abeyance.

LNG Operations

To ensure efficient and reliable operation of LNG facilities subject to its jurisdiction and to ensure sound engineering practices at these facilities, the Commission conducts periodic reviews to detect and eliminate any problems or potentially dangerous conditions. As part of its certification process, the Commission conducts a cryogenic design and operating review of each proposed LNG project. Final design plans are reviewed and on-site inspections are conducted both during construction and shortly after plant operations commence. All operating jurisdictional LNG facilities are inspected biennially.

The inspections ensure that reliable operations are maintained at these important peak-day gas supply facilities in order that the pipelines are able to meet their market requirements. Slowdowns or outages in deliveries from such facilities can jeopardize service to high-priority users such as residential customers during cold weather when loads are temperature-sensitive and when supplies are most critical.

Import/Export

The major new import proposal from Canada to the Northeast U.S. has developed into a three-way competitive proceeding. These three massive competing proposals have been consolidated and set for hearing. Another U.S. market for which Canadian import proposals have been filed is the market for enhanced oil recovery steam generation uses in Southern California. This too is expected to involve three competing proposals, two of which involve Canadian gas. Contracts for the sale of Canadian gas from the Sable Island area, off Canada's eastern shore, have been signed with several U.S. companies, export and import application have been filed with Canada's National Energy Board and the Economic Regulatory Administration, and applications for new facilities to transport this gas are expected. We have also been informed of a proposal to convert a portion of the Portland, Maine to Montreal oil pipeline to use as a natural gas line.

One request for abandonment of service involving Mexican gas was filed in FY 1985 since the Mexican imports were terminated in October 1984. Further related abandonments may also be filed shortly. Continued uncertainty over LNG imports from Algeria to the one remaining importer and the proposed abandonment of another LNG terminal will involve future Commission action.

The newest development in the import area is short-term or spot sales from Canada. Pipelines, distributors, and end-users have contracted directly or through brokers with Canadian producers for these supplies. Transportation of such volumes will involve Commission action, and a few applications involving spot sales have already been processed. Under Order No. 436 some imported spot gas may move under self-implementing authority, but transporting pipelines may still seek Section 7 transportation certificates.

Curtailments

Title IV of the NGPA required the Commission to restructure priorities in order to give special consideration to agricultural uses necessary to meet the requirements of full food and fiber production. The current curtailment workload involves the implementation of NGPA Sections 401 and 402 requirements and the continuing responsibilities mandated by Sections 4 and 5 of the NGA. Section 401 was implemented initially in 1979; however, the requirements of the essential agricultural users including the determination of the availability of alternative fuel, must be updated annually, even when no curtailment is anticipated. The rules pertaining to Section 401 may need to be revised based on a decision made by the U.S. Court of Appeals for the District of Columbia Circuit. According to the decision, the Commission issued regulations stating that agricultural users, as certified by the Department of Agriculture under NGPA Section 401, are to receive 100 percent of current requirements under all curtailment plans. The Court indicated that the Commission has discretion to direct the inclusion of either current requirements or requirements based on historical utilization as developed in a record proceeding. The Commission will assess the impact of essential agricultural use load growth on high priority residential users and curtailment plans under Section 401 and will determine what action is necessary on this issue, including the need for additional rulemakings.

During FY 1984, the U.S. Court of Appeals for the Fifth Circuit remanded to the Commission for further consideration proceedings involving the question of whether compensation is due to the customers of United Gas Pipeline Company and as a result of past curtailment. The Commission has received comments from the participants in the United curtailment proceedings and is considering what further proceedings may be necessary. Curtailment matters such as the prioritization of transportation volumes have been addressed in Order No. 436; therefore, a Commission decision addressing the other curtailment rules is anticipated in the future.

As a result of increased competition, pipelines are proposing increased service to existing customers or the addition of new customers such as those providing cogeneration. These new sales may require revision of the existing curtailment plans to reflect changes in the end-use profiles of the affected customers. In several instances, proposed revisions have met with opposition by other customers whose service may be adversely affected in the event of future curtailments. In those instances, formal hearings will be necessary.

It is anticipated that increased transportation with a concurrent reduction in sales obligation will engender more curtailment filings and a proportionate increase in formal proceedings.

FY 1985 Accomplishments Include:

- Contested reorganization of Montana-Dakota Utilities Company was resolved after intensive settlement negotiations resulting in the formation of Williston Basin Interstate Pipeline Company.

- Decisions were rendered on several controversial pipeline off-system sales.

- Authorized a number of proposals to transport customer-owned gas imported from Canada under spot purchase sales arrangements.

- Authorized on a temporary basis the "spot-sale" of imported Algerian LNG.

- Authorized the abandonment of an arrangement for the delivery of Mexican gas which resulted from Mexico's cessation of exports.

- Issued a decision denying a proposal to construct a salt cavern storage facility in Arizona.
- Prepared cultural resource impact reports on three major archaeological sites and received concurrence from the Advisory Council on Historic Preservation.
- Negotiated measures with numerous pipeline companies to mitigate environmental impact from pipeline and compression facilities concerning areas, such as erosion control, revegetation, alternative routing, cultural resources, noise, and residential property.
- Approved a portion of the largest Canadian import proposal, Boundary Gas, to construct facilities to transport, deliver, and sell Canadian natural gas to virtually all of New York and the New England states.
- Implemented final policy for and authorized numerous off-system sales by interstate pipelines, facilitating movement of volumes of short-term surplus natural gas and expedited completion of several formal cases involving non-routine off-system sales proposals.
- Completed nearly 500 prior notice requests authorizing, among other things, the transportation of natural gas for end-users at significant savings to the purchasers.
- Initiated a Notice of Inquiry followed by a Notice of Proposed Rulemaking in Docket No. RM85-1-000 to promote competition in the natural gas industry so that consumers are provided natural gas at the lowest reasonable rates consistent with reliable long-term service.
- Performed the biennial cryogenic design and reliability review at the LNG plants operated by Northern States Power Corporation, Distrigas Corporation, Southwest Gas Corporation, Northern Natural Gas Company, Associated Natural Gas Company, Northwest Pipeline Corporation, and Tennessee Natural Gas Lines, Inc.
- Conducted on-site monitoring of the effectiveness of environmental conditions and overall restoration of recently constructed pipeline projects in New York, Pennsylvania, Louisiana, Massachusetts, New Jersey, and Texas.
- Authorized several innovative marketing and self-help arrangements to retain and regain industrial gas customers and to assure continued consumer access to the lowest reasonable cost supplies.
- Authorized several unique proposals to provide discounted gas rate service to end-users who had switched or were in the process of switching to other fuels.
- Authorized numerous complex transportation and sales schemes under NGPA and NGA in order to provide specified end-users with reliable and economic gas supply sources.
- Acted upon several major offshore Texas construction projects to ensure that the most economic pipeline systems would be constructed.

Pipeline Certificate Workload

Increases in construction and operation and the curtailment areas reflect the anticipated impact of Order No. 436 on the natural gas markets during FY 1986 and FY 1987. Therefore, applications filed in FY 1987 are estimated to be 1,264 and completions are estimated to be 1,291 (Table 3). The pending workload will be decreased to 516 in FY 1987 or 11 percent less than the 577 cases pending at the end of FY 1985 (Table 4).

Table 3 - Pipeline Certificate Workload

	Receipts			Completions		
	FY 1985	FY 1986	FY 1987	FY 1985	FY 1986	FY 1987
Construction and Operation (Nonformal)	521	575	520	520	580	525
Construction and Operation (Formal)	14	30	25	10	25	30
Prior Notice Proceedings	510	420	450	490	430	450
Import/Export Related	55	35	45	47	60	65
Initial Service	1	3	3	1	3	3
Curtailment Plans (Nonformal)	39	45	50	36	44	47
Curtailment Plans (Formal)	2	5	8	2	3	6
Staff Adjustment	3	4	5	5	3	4
Abandonment	75	100	125	83	103	128
Emergency Transactions	15	32	33	25	32	33
Total	1,235	1,249	1,264	1,219	1,283	1,291

Table 4 - Workload Pending At End of Fiscal Year

	FY 1984	FY 1985	FY 1986	FY 1987
Construction and Operation (Nonformal)	285	286	281	276
Construction and Operation (Formal)	19	23	28	23
Prior Notice Proceedings	86	106	96	96
Import/Export Related	93	101	76	56
Initial Service	2	2	2	2
Curtailment Plans (Nonformal)	13	16	17	20
Curtailment Plans (Formal)	3	3	5	7
Staff Adjustment	2	0	1	2
Abandonment	48	40	37	34
Emergency Transactions	10	0	0	0
Total	561	577	543	516

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
Pipeline Rate Regulation: Operating Expenses	$19,688	$19,257	$19,560

Goals of the Pipeline Rate Program:

- Establish just and reasonable rates for the interstate transportation and sale of natural gas for resale that provides each pipeline company an opportunity to recover its costs and earn a fair return on investment dedicated to jurisdictional business.

- Establish fair and equitable rates for intrastate pipelines and distribution companies performing services under Section 311 of the NGPA.

Specific Objectives for FY 1987:

- Increased use of ADP techniques to process: (1) rate change (formal) filings; and (2) an increased number of PGA filings and transportation reports as a result of RM85-1.

- Reduce the pending workload by 38 items or nearly 5 percent from FY 1985.

- Process all rate filings within statutory time limits.

- Conduct formal proceedings expeditiously to minimize collection of unjust and unreasonable rates; and emphasize settlements.

- Reduce regulatory burden and streamline processing.

- Conduct field reviews to ensure that costs included in PGA filings accurately reflect costs incurred and that such costs are properly treated for rate and accounting purposes--particularly in view of the two block structure billing mechanism proposed in RM85-1.

- Conduct formal hearings to evaluate flow-through of purchased gas costs in order to prevent flow-through of amounts in excess of allowable costs.

- Ensure that refunds are timely and properly made.

Under the NGA, the Pipeline Rate Program is designed to ensure just and reasonable gas rates, to provide interstate natural gas pipelines a fair rate of return on their investment and at the same time protect consumers from being charged excessive rates or from being subjected to discriminatory treatment. Natural gas pipeline rates are regulated through various filings for certificated rate filings, rate changes, rate refunds, and PGAs.

Enactment of the NGPA substantially increased the workload due to the addition of rate jurisdiction over certain intrastate pipeline transactions. The Commission was given the responsibility for ensuring that rates and charges by intrastate pipelines for transactions under Title III of the NGPA are fair and equitable.

Rate Filings

Staff analyzes each rate filing and certificate application to determine the rate implications upon the pipeline, its customers and, ultimately, on consumers. In carrying out this function, analyses are performed to determine whether the proposed rates and charges are consistent with the Commission's statutory responsibilities, policy, case precedents, and regulations affecting rates, charges, and service conditions. A preliminary review and a report to the Commission of all rate and cost of service changes filed under the NGA must be made within 30 days of the date of the filing. Based upon the report, the Commission determines whether the filing should be accepted, rejected, or suspended and set for formal hearing to determine if the rates are excessive or result in any undue discrimination.

As a result of the implementation of Order No. 436, it is anticipated that a significant increase in the number of both nonformal and formal rate change filings made by pipelines will occur during FY 1986 primarily to institute nondiscriminatory tariff provisions in interstate pipelines gas tariffs which will broaden access to transportation services offered by pipelines to producers and consumers. The adoption of this voluntary, nondiscriminatory transportation program will impose an additional burden on the staff and the Commission from the standpoint of workload reviews required which will necessitate more processing time than the 30-day statutory requirement to process those filings going through the delegation, nonformal or formal phases.

At present the nonformal rate change filing is either accepted or rejected through delegation or Commission order within 30 days of the filing date. To the extent that some of these required new filings can be processed in 30 days, the length of process time will remain unchanged even though the amount of staff effort to process these filings may increase. However, under Order No. 436 the Commission will have an additional option of accepting the filing subject to conditions and refund which can result in a refiling by a pipeline with subsequent staff review to determine whether conditions have been satisfactorily met or whether a formal hearing is in order. It is expected that the bulk of these new filings will require a 60 or 90-day lengthening of the processing time frame to reflect the increased complexity of these nonformal filings.

The most complex formal rate increase cases involving major gas pipelines may require full litigation by staff and intervenors. These major rate cases usually include controversial issues, such as the reevaluation of the rate design methodology, that prevent quick resolution of the formal rate proceeding. This frequently results in a consolidated proceeding for more than one major rate case initiated by a pipeline over a three-year period. The adjudication of major pipeline rate cases, therefore, can include more than one rate case and may take more than one year before being decided by the Commission.

For major rate cases, statutory responsibilities are met by utilizing a case-by-case approach due to the variations in the operational and financial characteristics of the gas pipeline companies. All suspended filings are considered formal cases; an investigation is instituted and a hearing is held to determine whether the rates are just and reasonable. Approximately 70 percent of the rate cases involve partial or full settlement through negotiation with Commission staff and all other respondents. The average length of time for settlements and/or the number of cases settled is expected to be enhanced as a result of a management decision designed to automate much of the complicated formal rate work currently done by hand. The automated natural gas pipeline rate model will allow staff to analyze more quickly the voluminous amount of data submitted with each rate filing. Staff productivity will improve as a result of speeding calculations and processing time which lead to quicker settlements. The model is anticipated to be on line in FY 1986, and by FY 1987 it will play an important role in achieving productivity increases.

Receipts for FY 1986 and FY 1987 assume that inflation remains controlled and that increased competition resulting from phased deregulation of certain gas supplies will continue to discourage pipelines from filing rate changes except for those pipeline rate changes resulting from the required new filings in response to the Commission's Order No. 436. The rate filings that are contested by interested parties will require an evidentiary proceeding.

Transportation Transactions

These transactions cover self-implementing transportations pursuant to Title III of the NGPA and Section 7(c) blanket certificate authority of the NGA as implemented by the Commission's regulations at 18 CFR, Part 284. The transportation transaction vehicle has enabled natural gas to be shifted from the intrastate to the interstate market where it is needed in order to provide for a more fully integrated natural gas transportation system. The Commission has permitted interstate pipelines and companies holding NGA exemptions to obtain blanket authorization to transport and sell natural gas under the same self-implementing procedures available to intrastate pipelines.

Projections of the continued high levels of transportation transactions are based upon: (1) a continuation on the part of distributors and end-users to seek gas supplies through direct purchase; and (2) added emphasis on the part of producers to seek markets for gas that is in excess of their requirements of their conventional purchasers. With wellhead prices decontrolled on January 1, 1985, it is expected that much of the gas currently under contract will be released by pipelines and the producers will seek to market the gas elsewhere. Their ability to market the gas will depend upon whether transportation can be arranged under Order No. 436 or other regulations. Order 436 may be subject to court review. Court action precluding implementation of this order could drastically increase the number of transportation transactions under Section 311 of the NGPA received by the Commission during this period since these self-implementing filings would be the sole remaining self-implementing alternative to blanket end-use transportation arrangements. This emphasis upon transportation will result in continued high level of receipts as shown in Table 5.

Table 5 - Transportation Transactions

Fiscal Year	Total
1980	367
1981	513
1982	626
1983	990
1984	1,641
1985	2,365
1986	2,000 (est.)
1987	2,000 (est.)

Pipelines are utilizing transportation transaction filings to make fuller use of installed transportation capacity. This has generated a large influx of filings, requiring a large amount of staff time to process them. In addition, the intrastate filings are more difficult to process due to such factors as lack of intrastate company data and the complexity of relationships among the corporate entities involved in such transactions. The new procedures required by Order No. 436 may reduce the complexity of the filings. The Commission has 150 days to act upon the proposed rates and charges by pipelines for any transaction under Title III of the NGPA; otherwise the proposed rates or charges are no longer subject to adjustment. Therefore, staff must evaluate and determine that the proposed rates or charges are fair and equitable within this time frame.

In addition, the Commission has included financial incentives to pipelines in Order No. 436 to expand their transportation arrangements to give producers access to new markets. Under certain conditions, interstate pipelines have been authorized, through blanket certificates, to transport gas directly between producers and end-users without prior case-by-case Commission approval. Although Order No. 436 provides for the elimination of the extension reports due to the removal of the two-year term restriction which accounts for about 20 percent of the estimated transportation receipts for FY 1986, this level will start to grow again as the pipelines adjust to the new transportation market conditions and arrangements.

Tracking Filings and PGA Field Reviews

Natural gas pipelines are permitted to file semiannual tracking rate adjustments to reflect changes in their cost of purchased gas and other costs allowed by Commission regulations. These filings have a 30-day statutory requirement for initial action. In addition, pipelines seeking to recover purchased gas costs in excess of the PGA level are permitted to file semiannually on a deferred basis to recover such costs in the succeeding PGA filings. Should the Commission fully implement RM85-1 all pipelines will be required to bill gas costs using a two-tier pricing system. Revisions to both FERC regulations and FERC tariffs will be required together with a sophisticated accounting system to track costs separately. The impact will be a 26 percent increase in tracking receipts over FY 1985 and reassignment of staff to deal with the new complex accounting required under the proposed regulations.

In numerous PGA filings, customers have protested the pipelines' right to pass through incentive-priced and certain decontrolled gas costs and sought establishment of evidentiary hearings to determine the extent to which the pipelines' shareholders should bear these costs. The Commission has instituted proceedings to review: (1) the "affiliated entities" and "fraud, abuse, or similar grounds" issues; and (2) the prudence issues of the gas purchasing practices of a pipeline, to determine if they are consistent with long-term system requirements and current market constraints. These issues resulted in an increase in the number of formal tracking cases between FY 1983 and FY 1984. The level of case completions will peak in FY 1986 and is projected to remain at about this same level in FY 1987--well above the pre-1983 period. Staff has been reassigned to investigate related producer contracting practices and production-related cost transactions and also to prepare and participate in formal cases to determine whether inclusion of these costs is proper. The application of computer analysis to filed information will increase processing efficiency thus enabling staff to dispose of filings more expeditiously.

The Commission also examines the purchased gas costs and their propriety through a field review program. These reviews stress verification of the actual allowable purchased gas costs recovered through the scheduled semiannual filings. On-site verification is also necessary to ensure that gas purchases are properly categorized and are billed in conformance with regulatory requirements. Further, field reviews are used to evaluate cost and volume projections used by the pipeline in the filing. Results of past field reviews have indicated noncompliance by some companies and have produced significant rate reductions and refunds to customers. These reviews have also resulted in corrections to the accounting methodology used by pipelines for ratemaking purposes. These changes have helped to stabilize the surcharge fluctuations and reduce the overall carrying charges for both the pipelines and their customers. Additionally, staff may recommend formal hearings to resolve contested rate treatment and may serve as expert witnesses in these proceedings.

In FY 1986 staff will be involved in implementing the changes in gas costing and billing that will result from the requirements of proposed regulations under RM85-1. This will produce a large increase in the number of filings in the certificated rate filings, rate change nonformal, tracking, and refund categories that will require the shifting of staff and resources from other areas. Therefore, the number of field reviews conducted during FY 1986 will be unusually low. In FY 1987 the field review staff will spend a large percentage of time evaluating the implementation of the changes to the purchase gas cost mechanism as ordered by RM85-1 to ensure that these changes are properly effected. These reviews will be difficult and slow for both staff and the companies since the proposed rate making and billing requirements under RM85-1 are significantly different from the current system and both staff and the companies must undergo a rigorous learning process.

In an effort to minimize the costs accrued to residential and small commercial users, the incremental pricing mechanism under Title II of the NGPA requires that certain costs of acquiring natural gas be passed through as a surcharge on sales to large, industrial users. The Commission may exempt certain gas users from incremental pricing subject to Congressional review. Both the regulations and tariff provisions covering this program will also have to be revised to reflect RM85-1 changes. Under the NGA, there is no comparable activity to the NGPA incremental pricing requirements. As a consequence, the Uniform System of Accounts was revised to allow costs to be aggregated into new incremental pricing accounts in the natural gas industry. These accounts require audits by staff for technical, accounting, and enforcement purposes.

The FERC has established the NGPA mandated procedures for making staff adjustments to or exceptions from incremental pricing surcharges to prevent special hardship or an inequitable distribution of burden. Requests are automatically denied if an order is not issued within 150 days after the filing date. Interim relief can be granted while the proposed adjustments are under consideration. Hardship situations are reviewed on a case-by-case basis.

Refunds prior to RM85-1 were handled as part of the PGA's flow-through mechanism and were designed to keep refund work for pipeline companies to a minimum. It was determined that this mechanism was sending false signals to the pipeline's customers' investment community as to the actual price of gas, and therefore should be revised to require pipelines to make cash refunds for periods after the implementation of RM85-1. During FY 1986 pipelines will be required to establish refund provisions in FERC tariffs and make periodic reports thereafter. The net impact is expected to be two times the number of filings received over the FY 1985 level.

Financial Audits (Gas Pipeline Companies)

The Commission, in its ratemaking and other regulatory activities relating to natural gas pipelines, has a continuing need for reliable and comparable accounting information from individually regulated pipelines and the industry as a whole. This need is essentially met through the establishment and maintenance of a Uniform System of Accounts for Natural Gas Pipelines; through requirements for periodic financial reporting; and through a program of financial audits of jurisdictional companies.

The Commission's accounting regulations are kept current and modern by the issuance of rulemaking notices, orders, and interpretations as necessary to reflect contemporary ratemaking actions, changes in financial accounting standards, and the issuance of new laws and regulations. The accounting information obtained from financial statements prepared under standards uniformly applied to all regulated pipelines forms the basis for measuring both historical economic performance and compliance of billing practices to the terms of approved certificates and tariffs. Additionally, the accounting information is used to determine the adequacy of current rates and provides the foundation for constructing ratemaking models useful for the development of future rates.

The required assurances that the Commission must have that the basic financial information used in this economic regulation is sound and reliable is obtained essentially through a program of financial audits.

These audits are conducted on a cyclical basis. Approximately 60 percent of the 112 gas transmission companies subject to the Commission's accounting regulations are audited on a three-year cycle. The remaining companies are audited more or less frequently, depending upon such factors as the extent of automatic adjustment clauses, rate filings, and other similar considerations. The audits, which are conducted on-site by field auditors, encompass selected reviews of rate matters as well as audits of the basic financial statements and related books and records. The audit includes a review of company records for compliance with the uniform system of accounts for such items as purchased gas costs, gas storage costs, computations of carrying charges, exchange gas, transportation revenues, refunds of gas expenditures, and computations of unrecovered incremental gas costs.

During each audit, the staff places special emphasis on reviewing costs which are permitted to be automatically passed through rates because of the continuing need for regulatory surveillance of such costs. A company found to have improperly charged customers under the provisions of an automatic adjustment clause is ordered to refund any excess amounts with interest.

The financial audits continue to increase in importance as the complexities of accounting and ratemaking issues intensify. Among these are income tax accounting for joint ventures and partnerships, accounting for gas plant investments, and accounting related to purchased gas cost. The audit staff is aware of the increased pressures that these and similar issues present and must assure that the pipeline companies satisfy the intent of the Commission's accounting requirements. Audit findings for FY 1984 resulted in adjustments to rate base accounts in excess of $360 million which will translate into substantial savings in customer rates.

For FY 1987, the audit staff plans to complete 26 financial audits, the same as the previous year, which is 3 more than are planned to be initiated, thereby resulting in a decrease in the pending audit workload by the end of FY 1987.

Pipeline Rate Workload

During FY 1987, 20 field reviews are planned by the Commission to ensure that the pipelines have correctly implemented the requirements proposed in RM85-1 and to ensure that the costs reflected in the PGA filings reasonably represent costs that should be passed through to customers and consumers. Staff will also process 325 tracking (nonformal) filings, almost 100 more than FY 1985, and 400 refund filings, nearly triple the number in FY 1985. In FY 1987, staff will complete over 2,000 transportation transactions and review 15 requests for adjustments under Section 502(c) of the NGPA. Thus the workload in this program is expected to increase in FY 1986 and continue through the budget year at a high level. And although overall complexity is increased, use of automated systems and judicial use of staffing should enable FERC to handle the increased workload with approximately the same staffing as FY 1985.

The workload increases in the Pipeline Rate Program in the past have been due to the NGPA. Workload is expected to remain at a high level for FY 1986 and beyond, principally due to the impact of Order No. 436. However, as a result of improved productivity and management initiatives, the pending workload at the end of FY 1987 is expected to decrease by nearly 5 percent from the amount pending at the close of FY 1985.

Table 6 - Pipeline Rate Workload

	Receipts			Completions		
	FY 1985	FY 1986	FY 1987	FY 1985	FY 1986	FY 1987
PCA (Field Reviews)	11	5	20	11	5	20
Certificated Rate Filings	608	650	550	618	650	550
Rate Change (Nonformal)	174	200	200	187	200	200
Rate Change (Formal)	94	100	70	106	90	80
Rate Change Tracking (Nonformal)	257	325	325	234	325	325
Rate Change Tracking (Formal)	35	30	30	26	36	36
Transportation Transactions	2,365	2,000	2,000	2,255	2,010	2,010
Refunds	193	400	400	139	400	400
Staff Adjustment	19	15	15	11	15	15
Financial Audits	29	23	23	39	26	26
Total	3,785	3,748	3,633	3,626	3,757	3,662

Table 7 - Workload Pending at End of Fiscal Year

	FY 1984	FY 1985	FY 1986	FY 1987
PGA (Field Reviews)	4	4	4	4
Certificated Rate Filings	76	66	66	66
Rate Change (Nonformal)	46	33	33	33
Rate Change (Formal)	83	71	81	71
Rate Change Tracking (Nonformal)	39	62	62	62
Rate Change Tracking (Formal)	67	76	70	64
Transportation Transactions	274	384	374	364
Refunds	41	95	95	95
Staff Adjustments	4	12	12	12
Financial Audits	12	23 1/	20	17
Total	646	826	817	788

1/ Reflects increase of 21 in pending workload at start of FY 1985 for financial audits due to a change in internal processing procedures.

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
Producer Certificate Regulation: Operating Expenses	$2,452	$2,546	$2,330

Goals of the Producer Certificate Program:

- Reducing the number of pending applications and the timely processing of new natural gas producer applications in a manner that is consistent with the Commission's responsibilities under the NGA and the NGPA.
- Making regulation as efficient as possible for the approximately 200 large producers whose activities remain under the Commission's jurisdiction and about 9,500 small producers, many of whom have no further filing requirements under current regulations.
- Ensuring adequate review of sales subject to certificate filing requirements to ensure that the proposed service is or will be required by the present or future public convenience and necessity.

Specific Objectives for FY 1987:

- Process all filings promptly.
- Reduce pending by 50 cases or 23 percent from FY 1985.
- Ensure compliance with all rules and regulations.
- Reduce regulatory burden and streamline processing.

Producers of natural gas which is ultimately sold for resale in interstate commerce came under Commission jurisdiction in 1954 when the Supreme Court ruled that they were subject to the NGA. Under the NGA, as implemented by Commission rules and regulations, natural gas producers file applications for certificates of public convenience and necessity authorizing their sales of gas for resale in interstate commerce. They also file for authorization to abandon such sales. The Commission's NGA jurisdiction over independent producers of natural gas was significantly affected by the NGPA. Specifically, sales of gas not committed or dedicated to interstate commerce before November 9, 1978, were removed from NGA jurisdiction. Some previously committed gas was also removed from NGA jurisdiction under Sections 601(a)(1)(B) and (2)(18)(B)(iii) of the NGPA.

Further deregulation of gas under the NGPA began on January 1, 1985, which affected price controls rather than certificate filing requirements. Initial certification of sales including successions will decline but there will continue to be certifications required for production from old leases in the Outer Continental Shelf (OCS). Implementation of the Commission's Order No. 436 is expected to cause additional certificate and abandonment applications commencing in FY 1986 as producers react to developing spot markets by requesting Commission authorization to abandon sales to existing purchasers in order to sell gas to other purchasers that have a market for the gas. Order No. 436 provides for expedited procedures for abandonments and certificate applications.

Small Producers

An independent producer whose total "jurisdictional sales" are not in excess of 10 Bcf and who is not affiliated with a major natural gas pipeline company may file a one-time application to cover existing and future sales. Since fewer new sales are subject to the NGA and thus do not require certificate authorization, applications filed by small producers are expected to decrease in FY 1987. Filings will cover situations, for the most part, where the producer acquires acreage, still subject to the NGA, through assignment. Other filings related to the small producer area should primarily be administrative in nature, such as name changes and certifications under Section 157.40(b)(6) of the Commission's regulations.

New Service

New service filings by large producers will also taper off, although there has been an increase in the complexity of filings as producers attempt to deal with current market conditions involving spot sales of committed or dedicated gas to nontraditional buyers. Another type of filing that is occasionally made involves producer requests for authorization to build their own pipelines to deliver gas to purchasers. Moreover, the implementation of the Commission's Order No. 436 should result in applications for certificates being filed to request authorization to make sales to new purchasers that have markets for gas in situations where the existing purchaser has agreed to release the gas. Applications filed pursuant to Order No. 436 will be handled under the expedited procedures established in that Order. The shifting from sales to pipelines to transportation oriented filings will result in sales by producers to local distribution companies, particularly from Section 102(d) sources, and a restructuring in the industry which will include mergers of small producers with larger producers and new entrants into the field. In addition to these filings, the certificate program receives new service filings, successions, name changes, change or addition of delivery points or other changes in service involving gas that was committed or dedicated to interstate commerce on or before November 8, 1978. As long as there is a surplus of supply, it can be expected that producers will seek ways to market gas that their conventional purchasers are unable to take.

Abandonments/Termination

Producers apply for abandonment authorization to cease the interstate sales of natural gas that are subject to the Commission's NGA jurisdiction. In FY 1985, we experienced a greater than expected increase in receipts due to a large number of producer filings made in response to a change in metering policy implemented by a pipeline purchase. Prior to FY 1985 there had been a general increase in abandonment/termination receipts, and this trend is expected to continue in FY 1986 and FY 1987. These filings include proposals to abandon sales of gas that had been reserved in sales contracts, to abandon sales to contract purchasers in order to market the surplus supplies elsewhere, and to abandon sales where the reserves have become depleted. Additional abandonment applications are expected beginning in FY 1986 as the Commission implements its Order No. 436 reflecting the release of gas by existing purchasers in reaction to developing spot markets. Abandonments filed pursuant to Order No. 436 will be handled under the expedited procedures prescribed therein. Since 1981, we have been receiving a generally increasing number of abandonment applications specifically resulting from producer reaction to changed market/supply conditions. Abandonment applications are critical to the Commission's evaluation of the spot sales programs and frequently require detailed and difficult analysis.

FY 1985 Accomplishments Include:

- Completed 22 producer applications for special marketing programs including 2 applications by brokers.
- Completed majority of filings received in New Service/Amendment area and reduced the number of pending applications by more than one-third.
- Handled an increasing number of applications filed by producers seeking authorization to abandon sales to the dedicated purchaser in order to sell instead to a purchaser who is able to take the gas. Many of these applications involved reduced demand on the dedicated pipeline purchaser's system where the sales were not covered by special marketing programs.

Producer Certificate Workload

Since the certificate workload involves gas that remains subject to the Commission's NGA jurisdiction, the January 1, 1985, deregulation of natural gas, had no direct effect on the producer certificate program. However, there was a reduction in receipts in the small producer and new service categories because of the current oversupply of gas. Receipts for FY 1986 and FY 1987 include filings anticipated to result from Order No. 436.

The NGPA was an effort to encourage new gas production. Staff is now dealing with energy regulations passed during a time of gas shortage whereas gas company filings made now, during a time of gas oversupply, present complex new situations.

Table 8 - Producer Certificate Workload

	Receipts			Completions		
	FY 1985	FY 1986	FY 1987	FY 1985	FY 1986	FY 1987
Small Producer	118	90	80	127	90	80
New Service	294	335	290	347	355	310
Abandonment/Termination	555	540	545	569	545	550
Total	967	965	915	1,043	990	940

Table 9 - Workload Pending at End of Fiscal Year

	FY 1984	FY 1985	FY 1986	FY 1987
Small Producer	19	10	10	10
New Service	151	98	78	58
Abandonment/Termination	124	110	105	100
Total	294	218	193	168

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
Producer Rate Regulation:			
Operating Expenses	$2,112	$2,516	$2,460

Goals of Producer Rate Program:

- Ensure compliance and enforcement of Commission rules, regulations, and orders.
- Establish just and reasonable rates for producers.
- Provide adequate incentives for producers to develop and maintain a sufficient supply of natural gas at reasonable and affordable costs to consumers.

Specific Objectives for FY 1987:

- Process all rate filings within statutory time limits.
- Reduce regulatory burden and streamline processing.
- Ensure that only rates which conform to the NGPA rate structure are approved for collection.
- Reduce pending workload to a two-month working inventory.

Producers selling natural gas that remains subject to the Commission's jurisdiction under the NGA must make certain filings to increase the price for the sale of their gas or to reflect amendment of provisions of their sales contracts. These filings include changes in take-or-pay amounts and conventional rate increase filings made pursuant to Section 4 of the NGA. These filings are reviewed and analyzed to ensure compliance with the Commission's regulations and to ensure that the rate change is in accordance with the NGPA and authorized by the contract covering the sale. Staff adjustments and special relief applications are two other types of filings that a producer can make to increase the price it proposes to charge. Such filings are analyzed to determine whether relief from the maximum lawful price is appropriate. The final type of rate filing that a producer can make is an application for the collection of a production-related cost allowance in excess of the generic allowances prescribed by the Commission. In addition to these filings, the regulations which instituted the Production-Related Cost Board will generate the filing of complaints, referrals by staff pursuant to audit reviews, and referrals, by order of the Commission, of violations of Title I of the regulations pertaining to production-related costs. In addition, staff conducts investigations of possible violations of the Commission's rules and regulations and, if necessary, initiates appropriate enforcement action.

Rate Filings

Producer rate regulation was established for sales of gas in interstate commerce by the U.S. Supreme Court decision in 1954 relating to the NGA. This decision resulted in the Commission's establishing procedures to provide just and reasonable rates for sales of natural gas for resale in interstate commerce and for the filing of rate schedules detailing the terms, conditions, and rates for each sale of natural gas. Section 4 of the NGA provides that such rate schedules and changes to them be filed with the Commission and be kept open for public inspection. It is the responsibility of the Commission to determine the lawfulness of all rates, changes, classification, or service provided under a rate schedule. Since the passage of the NGPA, evaluation of filed rate changes has been limited to verifying contractual authority to charge the new rate and determining that the rate is not higher than that permitted for the sale by the NGPA.

The decontrol provisions of the NGPA have eliminated the possibility that new sales would be subject to Commission jurisdiction. Also the number of rate filings made by producers will continue to decline as older sales are terminated, as old gas reservoirs are depleted, or once producers establish blanket affidavit authorization to collect maximum lawful prices. Two other events have impacted the number of filings received by the Commission. The rulemaking establishing filing fees for producer rates may have contributed to producers carefully reviewing their filing needs to reduce filings which would result in revenues less than the filing fee and to reformat filings to enlarge the number of transactions included in a single filing.

Special Relief

Special relief applications are filed by gas producers seeking a rate higher than the prevailing ceiling rate or maximum lawful price under the NGPA. In order to receive special relief, a producer must supply cost data which is evaluated by staff. The Commission reviews special relief applications and develops standards on a case-by-case basis under the authority of Sections 104(b)(2), 106(c), or 109(b)(2) of the NGPA. However, the producer applying for relief is required to include the reasons that the gas does not qualify for any other NGPA pricing relief, an explanation of why a special relief rate is necessary, and why the current maximum lawful price is inadequate. The number of receipts of special relief applications is limited due to the nature and the justification required.

Production-Related Costs

In FY 1983, final regulations were issued implementing Section 110 of the NGPA to allow natural gas producers to recover certain production-related costs. These regulations established generic production-related cost allowances which reduced the need for evaluating allowances on a case-by-case basis. Most of the pending applications were completed in FY 1984 in accordance with the implementing regulations; however, there will continue to be some cases which involve exceptional circumstances not covered by the generic allowances. These will require individual evaluation and processing. Four such cases are expected to be initiated in FY 1986 and the same number in FY 1987. These cases will involve gas remaining under NGPA price controls for which the generic allowances are found inadequate or not applicable due to the unrepresentative nature of the production-related services performed by the producer.

In FY 1985 the Commission established the Production-Related Costs Board, in Docket No. RM83-6-000, in conjunction with Order Nos. 94-A and 94-B issued January 24, 1983. This series of orders established final regulations implementing Section 110 of the NGPA to allow natural gas producers to recover certain generic production-related cost allowances and eliminated the need for justification of allowances on a case-by-case basis. However, the Commission recognized that in self-implementing procedures such as these, room for potential abuse exists. Accordingly, the Commission set procedures for resolving disputes over whether Section 110 add-ons are proper. The Board will render determinations on whether refunds are due for amounts collected under Section 110. The staff will undertake various investigations which are designed to reveal any overpayments, including the review of data filed in support of PGA filings reflecting recovery of production-related costs. All suspected violations will be referred to the Board for a determination which is subject to review by the Commission. Staff effort will be expanded in preparing submissions to the Board and in working on issues raised by outside parties for Board consideration. This activity will continue through FY 1987. These investigations are included in the production-related cost category for FY 1985 through FY 1987.

Staff Adjustments

Under Section 502(c) of the NGPA, the Commission established procedures for the filing of staff adjustments to prevent special hardship, inequity, or unfair distribution of burdens in the Commission's administration of the NGPA. Staff must also review and analyze requests for adjustments related to Section 110 regulations which provide for an add-on to the maximum lawful price for production-related costs where the producer claims costs in excess of the generic allowances within the prescribed standards. Processing action is required within 150 days. Two staff adjustments will be processed in FY 1987. Decontrol provisions of the NGPA do not affect the filing of producer staff adjustments.

FY 1985 Accomplishments:

- Reduced pending workload by 40 percent to a three-month working inventory.
- Implemented procedures to reveal overpayments for production-related cost services and established Production-Related Cost Board.

Producer Rate Workload

Staff will complete 1,747 filings in FY 1987 while receipts are estimated to be 1,719. Table 11 shows that only 256 items will be pending at the end of FY 1987 compared to 385 for FY 1985, or a reduction of 33 percent.

Table 10 - Producer Rate Workload

	Receipts			Completions		
	FY 1985	FY 1986	FY 1987	FY 1985	FY 1986	FY 1987
Rate Filings	1,553	1,700	1,700	1,799	1,800	1,720
Production-Related Costs	2	28	13	4	19	21
Special Relief Petition	1	4	4	5	14	4
Staff Adjustment	0	2	2	0	2	2
Total	1,556	1,734	1,719	1,808	1,835	1,747

Table 11 - Workload Pending at End of Fiscal Year

	FY 1984	FY 1985	FY 1986	FY 1987
Rate Filings	617	371	271	251
Production-Related Costs	6	4	13	5
Special Relief Petition	14	10	0	0
Staff Adjustment	0	0	0	0
Total	637	385	284	256

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
Administration of Wellhead Pricing:			
Operating Expenses	$7,580	$6,669	$6,057

Goals of the Wellhead Pricing Program:

- Continued implementation of the phased decontrol provisions of the NGPA for the volumes of gas price-decontrolled on January 1, 1985.
- Prepare for the last phase of decontrol under which gas from certain new on shore production wells will be price decontrolled on July 1, 1987.
- Ensure that prices for gas remaining under price control do not exceed the statutorily established maximum lawful prices.

Specific Objectives for FY 1987:

- Reduce pending workload below 11,000 items, or 38 percent less than FY 1985.
- Ensure continuation of an effective NGPA well determination process.
- Ensure continuation of a cooperative relationship with state and Federal agencies involved in the determination process.
- Verify that natural gas wells are properly classified and that lawful rates are being charged to protect consumers from overcharges.
- Carry out an effective audit program.
- Further reduce regulatory burden and streamline processing.

The NGPA Determination Process

The NGPA established a series of statutory maximum lawful prices for various categories of natural gas sold to both the interstate and intrastate markets. To collect the incentive prices under Sections 102, 103, 107, and 108, a producer is first required to obtain a determination that the gas to be sold actually qualifies for the incentive price or for a decontrolled price. Under the NGPA, the determinations of eligibility are made by the appropriate state or Federal agency regulating the gas production involved. These determinations, approximately 50,000 annually, are subject to review by the FERC, which may require additional information, remand, or may reverse the determination.

NGPA Deregulation Provisions

In addition to establishing maximum lawful prices, the NGPA provided for a phased schedule for price decontrol which in general terms would ultimately decontrol most new gas while retaining price controls on old gas until depletion. The first phase of the decontrol process began on November 1, 1979, at which time price controls were removed for certain high-cost gas under Section 107, most significantly the production from wells completed below 15,000 feet. Although this gas was price decontrolled, a producer was still required to first obtain a determination that the gas was, in fact, eligible for decontrol.

Additional volumes of gas were price decontrolled on January 1, 1985. The last phase of the decontrol process occurs for production from certain shallow Section 103 wells on July 1, 1987. At that time, it is estimated that approximately 40 percent of the gas will remain price controlled. Currently, as with deep gas, determinations are still required to evidence eligibility for decontrol. The NGPA also provides that the President, with congressional approval, or Congress itself, may reimpose price controls for an eighteen-month period no earlier than July 1, 1985, nor later than June 30, 1987.

Summary of Deregulation's Effect on the Wellhead Pricing Workload

- The determination process required by the NGPA continues under partial decontrol in order to evidence the eligibility for decontrolled prices.
- With larger volumes of gas eligible for decontrol, the need and importance of pricing audits (the Commission's principal compliance tool) will continue in order that the Commission can assure both the consumer and Congress that only eligible gas is receiving a decontrolled price.
- The need to monitor and ensure refunds of over-collections will continue.
- Commission enforcement of regulatory requirements to ensure the integrity of the pricing rules will continue.

Jurisdictional Agency Determinations

Under the NGPA, the 33 state or Federal jurisdictional agencies review applications containing geological and engineering information and production records to determine if the gas produced by a particular well satisfies the statutory criteria for the incentive pricing category requested by a producer. This includes applications for gas currently price decontrolled under Sections 102, 103, and 107(c)(1)-(4) of the NGPA. The Commission is then notified of the determination for each application. The Commission works closely with the 33 jurisdictional agencies to ensure that the NGPA is uniformly applied. The Commission has the authority to reverse a jurisdictional agency's finding or remand it for further consideration. However, the FERC review process is controlled by a 45-day statutory limit. Any determination not tolled, reversed, or remanded by the FERC within the 45-day period automatically becomes effective. Since the NGPA was passed in FY 1978, the Commission has processed more than 340,000 determinations.

Under the existing NGPA legislation, certain gas under Sections 102 and 103 was price decontrolled on January 1, 1985. The last phase of decontrol occurs on July 1, 1987, when certain shallow Section 103 gas is price decontrolled. However, the determination workload will not decline since the Commission has determined that the NGPA requires a determination to evidence the eligibility to collect a decontrolled price. The requirement for filing was confirmed by the Commission in Order No. 406 issued November 16, 1984.

Determination Audits

The determination audit procedure is a two-part process involving both in-house desk audits as well as field audits. During the initial stages of NGPA implementation all determinations were desk audited to insure that the state and Federal jurisdictional agencies were properly interpreting and applying the statute and Commission regulations, as well as identifying specific determinations which did not meet the substantial evidence standard. As the determination process improved, a selective review process was initiated, necessitated in part by the large number of filings received as well as reductions in staff. Under the sampling procedure which is weighted toward higher cost gas categories, approximately 1 to 2 percent of all well determinations received are tolled.

In addition to the desk audits, field audits are performed on approximately 2 percent of all determinations filed - 1,000 wells annually. Although some field audited wells are follow-ups to the desk audit, most are targeted on other selected factors and include determinations from each of the 33 jurisdictional agencies. The field audits in conjunction with the desk audits have continued to make the determination process effective. We believe that industry knowledge of the audit activities has also contributed to a higher level of accuracy in the determinations received.

Pricing Audits

The pricing audit is the Commission's principal NGPA compliance tool. The FERC has the responsibility to ensure that natural gas producers are adhering to the pricing determination procedures to protect consumers from overcharges. It was envisioned under the NGPA regulations that reporting burdens would be kept to a minimum and that much of the compliance would be accomplished through review of gas producing company records and pipeline transaction files. This responsibility is carried out through a field audit program to ensure that producers are not charging unlawful rates. Areas audited include rates collected under the interim collection procedure, BTU refunds, continued eligibility of stripper gas wells, and potential overpricing of gas from a lower-priced category. The pricing audits are based on a sampling process which includes sales under each of the eight general pricing categories of the NGPA. The importance of pricing audits will increase under partial decontrol in order to enable the Commission to ensure that sales claimed to be decontrolled are not subject to ceiling prices. The Commission stated in Order 406 that it will rely on audits to ensure compliance with the deregulation provisions. Audits are also conducted to establish that sales of natural gas dedicated to the interstate market under the NGA have not been improperly qualified for incentive price categories under the NGPA.

In FY 1983, the Commission finalized its approach and methodology to the recovery of production-related costs under Section 110 of the NGPA. Consistent with regulatory reform goals, recovery of these costs does not require any filing with the Commission. It is anticipated that recovery of production-related costs, such as gathering, compression, and conditioning, will result in significant charges to purchasers. The Commission recognized that self-implementing programs are subject to abuse and stated that field audits will be conducted to ensure that consumers are not overcharged. These audits are a part of the pricing audit program.

Because an audit requires a major commitment of Commission resources, not all producer claims can be audited. In the past, Commission staff has concentrated on large producers and on contracts covering large volumes of gas. While this was practical during the first years under the NGPA, the staff has now expanded its audits to a more representative coverage of all wells and producers.

Through the audit program, the Commission ensures that the determination process works effectively, verifies that proper rates are being charged, and protects consumers from overcharges by review of determinations. The program is designed to minimize regulatory burden and place maximum reliance on the good faith compliance of the natural gas companies.

Incentive Pricing

Under the authority of Section 107 of the NGPA, the Commission established procedures to designate gas produced from geological tight formations for an incentive price up to 200 percent of the Section 103 prices. Under the procedures established in Order No. 99, a jurisdictional agency nominates a tight formation and the Commission reviews the recommendation. Upon approval by the Commission of a jurisdictional agency's recommendation, applications for well determinations are filed to qualify individual wells for the incentive price. Upon approval of the individual well determination, a producer may collect the incentive price for all deliveries retroactively to the date of initial delivery or July 16, 1979, whichever is later.

The Commission expects to continue to receive tight formation nominations through December 31, 1985, due to the retroactive pricing benefit. However, by the end of FY 1986, all nominations should be acted on. It is anticipated that this program will phase out in FY 1987, and no further workload is projected. Although a recent GAO report critized some of the policy decisions the Commission made in Order No. 99 which established the incentive prices for tight formation gas, GAO made no recommendations for change since most tight formation gas was deregulated as of January 1, 1985.

Refund Procedures

The NGPA allows sellers to collect certain ceiling prices on an interim basis pending a final well category determination. If a well is determined not to qualify, or if an application for category determination is withdrawn, refund of interim collections is required. Refunds are also required where determination audits, pricing audits, or other Commission orders indicate that prices in excess of the maximum lawful amount were collected.

To ensure that refunds are made to the consumer, the Commission monitors all actions which could generate a potential refund obligation and follows up to ensure that refunds are made. An example of the need for continued monitoring procedures is the refund requirement of Commission Order No. 399, as amended. Due to a change in the method of Btu measurement required for all NGPA sales, resulting from a court decision, over one billion dollars was required to be refunded by producers to pipelines. In turn, the pipelines pass these dollars through to their customers. The first of several reports filed by the pipelines involved (producers were not required to file Btu refund reports) indicate that approximately $68,000,000 owed by approximately 3,500 producers, has yet to be refunded. In addition to the Btu refunds, approximately $150,530,000 in NGPA refunds has been reported to the Commission with approximately $53,514,000 being reported during FY 1985. Effort is continuing in the refund area so that the refund backlog is substantially reduced by the end of FY 1987. The final rule in RM83-53 (Order No. 423) was issued on May 30, 1985, which amended the Commission's regulations to allow pipelines to seek refunds of excess interim collection through billing adjustments. This is expected to speed up the refund process and reduce the refund backlog significantly.

FY 1985 Accomplishments:

- ° Issued Orders 406 and 391 relating to deregulation and first sale treatment of pipeline production.
- ° Evaluated the impact of the NGPA and NGA on current and projected natural gas markets, including market-ordering problems associated with the partial deregulation of wellhead prices for natural gas under the NGPA.
- ° Approved jurisdictional agency nomination of 24 tight formations.
- ° Continued ongoing investigation associated with overcharges related to plant operations pursuant to Commission order.
- ° Issued final order in RM83-53 which allows pipelines to seek refunds that are due through billing adjustments.
- ° Issued a Notice of Proposed Rulemaking in Docket No. RM85-7 Stripper Gas Well Regulations to eliminate certain filing requirements and permit one time pressure build-up determinations.

Wellhead Pricing Workload

Table 13 illustrates the level of pending workload for each category in the Wellhead Pricing Program. In FY 1987, total pending workload will be reduced to 10,607 items, a 38 percent reduction from the FY 1985 level.

Table 12 - Administration of Wellhead Pricing Workload

	Receipts			Completions		
	FY 1985	FY 1986	FY 1987	FY 1985	FY 1986	FY 1987
J A Determination	47,973	50,000	50,000	47,777	50,000	50,000
Determination Audit	762	1,000	1,000	762	1,000	1,000
Pricing Audit	1,024	900	900	1,024	900	900
Incentive Price	13	5	0	24	27	0
Refund Procedure	10,680	10,500	10,500	12,432	13,500	14,000
Staff Adjustment	31	30	30	17	30	30
Total	60,483	62,435	62,430	62,036	65,457	65,930

Table 13 - Workload Pending at End of Fiscal Year

	FY 1984	FY 1985	FY 1986	FY 1987
J A Determination	4,828	5,024	5,024	5,024
Determination Audit	0	0	0	0
Pricing Audit	0	0	0	0
Incentive Price	33	22	0	0
Refund Procedure	13,815	12,063	9,063	5,563
Staff Adjustment	6	20	20	20
Total	18,682	17,129	14,107	10,607

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

HYDROPOWER REGULATION

Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
Hydropower Regulation			
Hydropower Licensing - Operating Expenses	$17,795	$19,201	$20,745
Dam Safety Inspections - Operating Expenses	7,891	8,789	8,598
Hydropower Regulation - Total Operating Expenses	$25,686	$27,990	$29,343
Staff Years	395	451	453

Authorization:

Hydropower Regulation: Federal Power Act; Public Utility Regulatory Policies Act; Reclamation Project Act; Water Resources Planning Act; Flood Control and River and Harbor Acts; Department of Energy Organization Act; Energy Security Act; Regulatory Flexibility Act; Crude Oil Windfall Profit Tax Act; Pacific Northwest Electric Power Planning and Conservation Act; National Environmental Policy Act; Fish and Wildlife Coordination Act; Wild and Scenic Rivers Act; Eastern Wilderness Act; Wilderness Act; National Historic Preservation Act; Clean Water Act; Endangered Species Act; Coastal Zone Management Act; Federal Pollution Control Act; and the Niagara Redevelopment Act.

Goals of the Hydropower Regulation Program:

- Ensure that licensed projects are best adapted to the development of the Nation's waterways.
- Ensure that environmental concerns are adequately addressed before licenses for hydroelectric projects are issued.

- Ensure that licensed projects are constructed, operated, and maintained for the protection of life, health, and property.
- Ensure compliance with requirements of licenses, exemptions, and preliminary permits.
- Bring electric power generation from renewable resources on line in the shortest possible time and in compliance with applicable laws and Commission regulations.

Specific Objectives for FY 1987:

- Give high priority to licensing projects proposing new generating capacity.
- Maintain level of project supervision to ensure an adequate dam safety inspection program.
- Improve ability to ensure full compliance with licenses, exemptions, and preliminary permits.
- Minimize regulatory burdens on applicants and licensees and streamline the procedure for processing of applications.

Productivity Standards:

- Increase productivity by 10 percent from FY 1985 levels.
- Reduce pending workload below projected FY 1986 levels.

The Commission's hydropower regulation program consists of two main elements: project licensing and dam safety inspection (including license compliance). The hydropower regulation program encompasses more than 1,400 hydropower projects, including both licensed and exempted projects, which represent over one-half of the Nation's hydroelectric energy generation. Hydroelectric projects supply 13 percent of the electric energy generated in the United States. This trend is expected to continue into FY 1987.

The development of hydroelectric power is consistent with achieving the goals of energy self-sufficiency and protecting against future escalation in oil prices. At the beginning of FY 1985, the Commission had 805 licenses in effect that authorized 1,150 developments; at the beginning of FY 1987 these totals are expected to increase to 935 licenses in effect, authorizing 1,337 developments.

The renewed and expanded interest in hydropower development has resulted in a rapid growth of the Commission's licensing workload. This trend, particularly as related to the construction of projects with new generating capacity, is illustrated in Table 14. From fiscal years 1981 through 1985, the number of applications for new capacity licenses, preliminary permits, and exemptions increased dramatically over levels experienced in previous years. The FY 1981 applications exceeded FY 1979 by more than 2,000 percent and the FY 1980 total by almost 300 percent. Although the total number of workload receipts in these three workload areas has decreased since FY 1981, a high level of applications has continued and workload has shifted from preliminary permits and exemptions to the more complex and labor-intensive areas of licenses and amendments. For example, receipts in the new capacity area were 91 in FY 1981; in FY 1985 receipts totaled 324, an increase of more than 250 percent.

Table 14 - Major Hydropower Licensing Receipts

	FY 1979	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985
New Capacity Licenses and Amendments	25	73	91	263	279	256	324
Preliminary Permits	76	501	1,856	944	630	776	636
Exemptions	0	0	177	475	373	235	172
Total	101	574	2,124	1,682	1,282	1,267	1,132

Recent court decisions have had or will continue to have a significant impact on the hydropower regulation program. The Supreme Court's decision in Escondido Mutual Water Co. v. La Jolla Band of Mission Indians rejected the view that the Commission retains exclusive conditioning authority over hydropower licensing, emphasizing instead that authority to impose reasonable licensing conditions for projects located within Federal reservations is dispersed among several Federal agencies. A decision by the Ninth Circuit Court of Appeals in Confederated Tribes of the Yakima Indian Nation v. FERC for which the Supreme Court denied certiorari, requires the Commission to analyze, among other things, fish and wildlife impacts before issuing a license. This decision also requires the FERC to follow NEPA procedures for relicense applications. Another decision, by the Court of Appeals in Tulalip Tribes of Washington v. FERC, invalidated the Commission's definition of a natural water feature exemption. This decision narrowed the number of projects qualifying for the exemption program, thus serving to shift workload to the more labor-intensive licensing program.

A fourth decision by the Ninth Circuit Court of Appeals (The Steamboaters v. FERC) requires the Commission to support any decision not to prepare an Environmental Impact Statement (EIS) for a project proposed for exemption from licensing with an environmental assessment (EA). The court stated that when the Commission evaluates applications for exemption from licensing, it must not rely solely on recommendations made by other Federal and state resource agencies in determining the need for an EIS but must instead reach this conclusion based on its own independent factual analysis. Thus, the Commission's staff must now prepare EA's not only on applications for license, relicense, and most amendments of license, but also for exemptions.

A decision by the U.S. Court of Appeals (Clark-Cowlitz Joint Operating Agency v. FERC) rejected the Commission's determination in the Merwin Dam proceeding that municipalities do not have relicensing preference over the original license of the project. That decision, however, was recently vacated by the Court and a new decision will be issued after further briefing by the parties.

The Commission has also instituted a procedure for assessing the cumulative impacts of multiple hydropower developments in specific river basins. A Commission directive issued in April, 1985 directs the staff to implement the Cluster Impact Assessment Procedure (CIAP) in the Salmon, Snohomish, and Owens River Basins. The procedure may be extended to additional river basins where the issue of cumulative impacts has been raised. During the various stages of this procedure, projects found to have no potential for cumulative impacts would be processed on a case-by-case basis.

The energy tax credit authorized by the Energy Tax Security Act is due to expire for any applicant whose application is not docketed with the Commission by the end of calendar year 1985. Furthermore, to be eligible for the credit, the project must be constructed and operating by the end of calendar year 1988. Because of these time frames, an increased number of applications for preliminary permits, licenses, and exemptions from licensing is expected during the first quarter of FY 1986. A portion of this increased workload will be carried over into FY 1987. It will be necessary to process these applications expeditiously in order for developers to have an opportunity to meet the 1988 deadline for commencement of operation.

Dam safety inspection is the second major component of the Commission's hydropower regulation program. Dam safety inspections monitor the compliance of Commission licensees with all applicable safety and environmental requirements during the construction and operation of a project. Under the authority of Section 10(c) of the Federal Power Act (FPA), the Commission has responsibility for the inspection of more than 2,000 dams.

The cost of the Commission's hydropower program is offset through the collection of annual charges from project licensees. In accordance with Section 10(e) of the FPA, each fiscal year the Commission assesses annual charges based on licensed operating capacity. The Commission estimates that offsetting collecions from 10(e) authority for the hydropower licensing program will total $33,386,000 in FY 1987. The FPA also authorizes the Commission to collect annual charges from a licensee for use of both Federal dams and lands. In FY 1987, a total of $2,090,000 will be collected. Total annual charges from licensees are estimated to be $35,476,000 in FY 1987, an increase of more than $3,200,000 from FY 1986.

The Commission also determines fees for benefits provided by federally-owned or federally-licensed headwater improvements. In carrying out this responsibility, the Commission conducts investigations to determine the equitable amount that an owner of a downstream, non-Federal hydropower development should pay to the United States or to a licensee for benefits provided by a federally-owned or federally-licensed headwater improvement. The Commission is currently reassessing and clarifying its methodology for determining headwater benefits charges. In FY 1987, the Commission plans to complete 16 headwater benefit determinations and to collect $7,500,000 in headwater benefits payments for deposit to the United States Treasury.

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
Hydropower Licensing: Operating Expenses	$17,795	$19,201	$20,745

Goals of the Hydropower Licensing Program:

- Bring electric power generation capacity on line in the shortest possible time.
- Ensure that licensed projects are best adapted to the development of the Nation's waterways.
- Ensure that environmental concerns are addressed before issuing a license for a hydroelectric project.

Specific Objectives for FY 1987:

- Give high priority to new capacity license applications.
- Expedite processing of preliminary permits, exemptions, and new capacity licenses, consistent with satisfaction of safety and environmental requirements.
- Streamline processing of applications and review informational requirements to reduce regulatory burden.
- Collect offsetting of revenues $35,476,000, including $33,386,000 in annual charges for operating capacity and $2,090,000 from licensees whose projects are involved with either a Federal dam or Federal lands.
- Collect non-offsetting revenues of $15,300,000; $7,500,000 in headwater benefits, and $7,800,000 in other annual charges for use of U.S. lands. These revenues are distributed to other Federal agencies.

Productivity Standards:

- Reduce pending levels below projected FY 1986 levels by 15 percent.

Under the hydropower licensing program, non-Federal hydroelectric projects are licensed pursuant to the FPA. This includes issuing licenses for non-Federal projects at Federal dams. Typically, such projects involve the addition of hydroelectric generating capacity to existing dams used for flood control, navigation, or water storage.

The major hydropower workload categories are: licensing of new capacity projects, preliminary permits, licenses for constructed projects, relicenses of projects with expiring licenses, and exemptions from license for certain small projects. A total of 1,736 workload actions will be completed in FY 1987 in the hydropower licensing categories.

As part of its licensing program, the Commission carries out a number of functions related to the ultimate construction and operation of hydroelectric projects. These licensing functions include: (1) engineering analyses of the design and safety aspects of project structures to include a prelicense inspection; (2) environmental analyses of project effects including CIAP analysis; (3) determination of lands of the United States to be reserved from entry, location, or other disposal; (4) determination of fees for benefits provided by Federally-owned or licensed headwater improvements; and (5) authorization of the use of project land and waters for non-power purposes. Although the majority of hydroelectric licensing matters are disposed of by order of the Commission or by letter order under delegated authority, a number of these cases require a hearing before an administrative law judge. Settlement discussions are held to permit the Commission, the applicant, and intervenors to attempt to resolve differences on some or all of the issues. If settlement attempts are unsuccessful, the matter goes to an evidentiary hearing for which the staff prepares testimony and appears for cross examination. The major components of the hydropower licensing program are described below.

New Capacity Project Licenses

The highest priority in the hydropower licensing program is the licensing of new capacity hydroelectric generating facilities, consistent with safety and environmental requirements. New capacity project applications must be acted upon expeditiously since licensing delays for these types of applications can result in large cost increases for the electric utility industry and developers, and ultimately increased rates for consumers.

As part of the licensing process, engineering analyses are conducted to ensure that the project design will be safe; environmental analyses are performed to assess the impacts to biological, recreational, and land use resources; economic analyses are performed to evaluate the feasibility of projects; and studies are conducted to determine whether unlicensed projects are subject to the Commission's jurisdiction.

The Office of Hydropower Licensing has instituted a "generic issue" tracking system to analyze hydropower applications constrained by generic problems. Approximately 60 percent of the pending new capacity license applications have similar problems that delay processing beyond normal time periods. Generic issues include such concerns as court decisions on various issues, competition among applicants, and cumulative environmental impacts. This method of classifying and tracking workload with common problems helps to identify major issues impacting the completion of hydropower workload and is leading to a faster resolution of the issues.

For FY 1987, the Commission plans to process 227 new capacity licenses, an increase of 30 completions or 15 percent more than 1986. New capacity workload has been increasing since FY 1982, when there was a major shift in workload from the processing of preliminary permits to the much more complex and labor-intensive new capacity licenses. New capacity licenses have become even more complex as a result of two recent court decisions which greatly expanded the requirements that the FERC place upon an applicant for its conformance with environmental rules and regulations of other agencies before issuance of a license and implementation of the CIAP. To support these environmental analyses, the Commission is requesting $3,129,000 for environmental support.

Exemptions

The purpose of the exemption program is to expedite the development of new generating capacity by significantly reducing the regulatory burden on applicants who qualify for exemption. The Commission issued regulations in November 1980 to implement Section 408 of the Energy Security Act (ESA) which would exempt the majority of the proposed hydropower projects with installed capacities of 5 MW or less from all or a portion of Part I of the FPA, including the need to obtain a license. As a result of these new regulations, more than 1,400 applications for exemption were filed during FY 1981 - FY 1985. As economic trends make some sites only marginally profitable, the number of applications for exemptions is expected to decline. This reduction in the number of applications filed should be accelerated further as a result of the Tulalip decision invalidating the Commission's definition of a natural water feature exemption. As a result, 61 of the issued exemptions or applications for exemptions that were invalidated were re-submitted as new capacity license applications or amended exemption applications in FY 1985. Twenty of the 61 pending exemption applications converted to a license application, nine pending exemption applications were revised, thirty voided exemptions were filed as license applications, and two voided exemptions were refiled as revised exemption applications.

Preliminary Permits

The Commission issues preliminary permits to provide potential developers licensing priority at a particular hydropower site while conducting feasibility studies, preparing detailed project specifications, and arranging financing for construction of a project. These permits may be granted for a period of up to three years. Approximately 30 percent of the preliminary permits issued have resulted in applications for a license to construct a hydropower project. The dramatic increases in applications for preliminary permits have resulted in subsequent increases in applications for new capacity licenses.

Constructed Project Licenses

The FERC may issue licenses to owners of constructed hydropower projects. Constructed projects are categorized as either major projects which have an installed capacity of over 2,000 hp, or as minor projects which have an installed capacity of 2,000 hp or less. For FY 1987, it is estimated that nine licenses will be completed for major and minor constructed projects.

Relicensing

The FERC determines whether a project whose license is expiring will be relicensed to the original licensee, a competitor, or recommended for Federal takeover (if the dam was previously licensed to a private entity). This involves an assessment of the project's utilization of the resource for power production, water quality control, coordination with other projects and systems, irrigation and agricultural uses, pollution abatement, recreation development, fish and wildlife conservation, and protection of historical and archaeological properties. The Yakima decision by the Ninth Circuit Court of Appeals affects this area by requiring the FERC to follow NEPA procedures for relicense applications. This decision increases the complexity of processing an application for relicense. The Merwin Dam decision by the Court of Appeals affects relicensing cases by determining that the municipal preference applies on relicensing, and by eliminating reliance on "broad economic considerations" as a basis for finding the original licensee's application to be better adapted, so the question of preference need not be reached. At the end of FY 1985, there were 46 applications for relicense pending, nearly all of which require detailed engineering and environmental reviews. For FY 1987, it is estimated that 17 relicense applications will be completed, reducing the pending level to 28 applications, a 40 percent reduction from FY 1985.

License Amendments

Each license the Commission issues contains requirements for the subsequent filing of various documents and reports related to the project. There are generally two types of these required filings. The first are reports compiled following required studies on environmental, technical, or economic issues. On the average, two amendments of this type are filed for each license within two years of issuance. The information developed on these issues may lead to changes in project design or operation. The second type of required filings are those which are informational and generally do not cause a change in the project. Several filings of this type, such as design plans and specifications, are typically due on any licensed project within the first few years.

Additionally, licensees, when they determine that a filing deadline cannot be met, request extensions of time for filing the required material. These actions also constitute applications for amendments of licenses. As more and more licenses are issued, the number of required license amendment filings also increases. While only 104 non-capacity amendments were filed in FY 1981, 600 are expected in FY 1987, an increase of 477 percent. The FY 1987 filings are also projected to be 9 percent greater than those filed in FY 1986. This is largely a result of increases in the number of licenses issued and projected to be issued from FY 1981 through FY 1986. For FY 1987, the Commission estimates that 550 non-capacity amendments to licenses will be completed. This represents an increase of 10 percent from FY 1986 and 17 percent more than FY 1985.

Another type of license amendment involves new capacity, normally a request to add additional generating capacity at an existing licensed project. The number of these applications filed is expected to decline from 25 in FY 1986 to 15 in FY 1987 due to the fact that there will be fewer old projects that have not already undergone revisions in order to maximize generation. The number of completions is expected to be 23, an increase of three, thereby resulting in a 17 percent decrease in the pending workload.

Headwater Benefits Determinations

In addition to its licensing responsibilities, the Commission is required to determine charges for headwater benefits. In accordance with Section 10(f) of the FPA, the Commission conducts investigations to determine the equitable amount that an owner of a downstream, non-Federal hydropower development shall pay to the United States or to a licensee for benefits provided by a Federally-owned or licensed headwater improvement. There are 62 river basins in which headwater benefits situations were found to exist. For nineteen of these 62 river basins no payments were due, and for another 19 river basins only non-federal licensees or permittees were involved. Of the remaining 24 river basins involving federal headwater projects, payments for headwater benefits have been or are being made in 14. In FY 1987, the Commission expects to complete 16 headwater benefit determinations and collect $7,500,000 in headwater benefits payments to the United States Treasury. From FY 1985 to FY 1987, the FERC will return $21,900,000 to the U.S. Treasury under this program.

Use of Project Sites

The Commission authorizes construction of public-use facilities on project lands or use of project waters. Examples include intake facilities for municipal water supplies, roads, bridges, transmission lines, telephone cables, water and gas pipelines, and sewage treatment facilities. All applications receive an environmental and engineering review to ensure that the proposed modification is consistent with the comprehensive use of the affected project's lands and waters.

Environmental Review

Each application for license, amendment of license, relicense, or exemption from licensing for a hydropower project is reviewed for compliance with the Commission's regulations, and the National Environmental Policy Act (NEPA), other environmental legislation and court decisions. Most of these applications require the preparation of an environmental assessment (EA) and some may require the preparation of an environmental impact statement (EIS). Staff evaluates environmental exhibits, considers state and Federal agency comments on those exhibits, conducts an independent analysis to determine adverse impacts, and prepares an EA that identifies these impacts and recommends appropriate mitigative measures.

In preparing an EIS, the staff makes a site visit and conducts scoping sessions to identify the environmental issues to be considered in the EIS, reviews the results of field studies, assesses the full range of the expected environmental impacts on the proposed project area, and recommends appropriate measures. This analysis includes an examination of the possible adverse effects on the physical environment that might result from the licensing or exempting the proposals. Contractual support from the DOE National Laboratories is used to assist the staff with its environmental analysis efforts.

The Commission has received an increasing number of applications for license, many of which are concentrated in particular river basins. Federal and state agencies, Indian Tribes, and environmental interest groups have filed pleadings with the Commission concerning proposed projects in selected river basins, contending there would be cumulative adverse effects if the projects proposed were to be constructed in a particular basin. To evaluate the environmental consequences of multiple hydropower developments and the potential for cumulative impacts, the Commission directed the staff to utilize the Cluster Impact Assessment Procedure (CIAP).

The CIAP will be completed in four phases: (1) the Geographic Sort Phase will be used to determine the geographic area of the study by identifying the projects and the target resources to be included in the CIAP; (2) the Resource Sort Phase will determine if there is an interactive relationship between projects and target resources; (3) the Multiple Project Assessment Phase will be used to analyze cumulative impacts; and (4) the NEPA Phase will result in an appropriate environmental document that complies with the Commission's requirements under NEPA.

The CIAP on a particular river basin will be used by the Commission to meet its responsibilities under NEPA and to assist the Commission in future licensing actions in the affected river basin. Projects identified in the first two phases of the CIAP as having no cumulative adverse impact on any of the target resources would be excluded from phase three and four and processed on a case-by-case basis. The remaining projects included in the CIAP would be analyzed for cumulative impacts on target resources, and the results of the analysis would be included in an appropriate NEPA document.

The staff also evaluates the environmental impacts of proposed amendments at licensed hydropower projects and conducts special field studies when there are particular concerns. These concerns may be raised by the staff, by another state or Federal agency, by an individual in the form of a complaint, or may result from a requested change in project operation or in uses of project lands and waters. The increasing number of environmental documents that must be prepared by the Commission's staff reflects the growing number of applications for hydropower licenses and amendments of license.

Power Site Lands

The FPA stipulates that any lands of the United States included in an application for a hydropower project shall, from the date of filing, be reserved from entry, location, or other disposition until otherwise directed by the Commission or by the Congress. The Commission evaluates requests for the restoration of power site lands to determine whether the proposed dispositions would injure or destroy the power value of the lands. The Commission may find that a reserve is no longer needed and take action to terminate it, determine that the power value of the land involved will not be injured or destroyed by restoration subject to the power reservation in Section 24 of the FPA, or deny the request for restoration. The Commission also evaluates applications for non-project uses (rights-of-way, mineral leases, geothermal leases) of power site lands and submits reports to the agencies which authorize such uses. In addition, the Bureau of Land Management requests Commission reports on the status of power site lands covered by mining claims filed under the Mining Claims Rights Restoration Act of 1955 to confirm that the lands involved are not covered by a permit or license issued under the FPA. The Commission estimates that a total of 450 power site land cases will be completed in FY 1987.

The Commission is conducting an overall review of land withdrawals performed under Section 24 of the FPA. The Commission has approved the plan to prepare indexes of essential project withdrawals and to vacate those projects that are no longer considered necessary in FY 1986. The Commission will identify and vacate nonessential land withdrawals effectuated by filing of hydropower applications by preparing indexes of withdrawals affected by pending or outstanding permits or licenses. The remaining withdrawals will be generically vacated. This information will be sent to BLM allowing vacations en masse. This action will allow staff to respond more expeditiously to requests for vacation of withdrawals and stipulations for power site use. It also will allow the vacation of several thousand nonessential withdrawals in FY 1986, resulting in a reduction of future filings by BLM with the Commission.

Project Design Analysis

The design of proposed or existing hydroelectric project structures for which applications or amendments to applications have been filed is analyzed to ensure dam safety, economic feasibility, and comprehensive development. State of the art design criteria are used to evaluate the safety of hydro structures. Computers are used for design computations, economic feasibility studies, and electric system expansion programs.

In addition, construction plans and specifications are reviewed in coordination with the inspection staff to assure that the structures will be built as designed and that construction materials will be selected and placed to achieve design strengths. Projects are inspected during construction to ensure that the approved design is compatible with field conditions and that field changes do not result in a substantial departure from the approved design. The licensee may be directed to amend its license when a significant design change is anticipated.

Hydroelectric projects licensed by the Commission include certain transmission facilities over which the power must flow to reach the user. The portion of these transmission facilities that is part to the project, and not part of an existing electric system, must be included in the license. Each license application is reviewed for determination of which transmission facilities are to be included in the license.

Federal Hydropower Evaluations

Staff's knowledge of electric power systems and hydropower generation is used by the Corps of Engineers and other Federal water agencies to aid their evaluations of multi-purpose water projects which include hydroelectric power. Staff assistance, in addition to some design aspects, includes the analysis of the prospective marketability of project power and its value, as measured by the cost of power from non-hydroelectric alternatives.

In FY 1985, analyses were completed at the request of the U.S. Army Corps of Engineers to determine power costs of the most likely thermal alternatives to possible multi-purpose hydroelectric projects. Also, projects by the Bureau of Reclamation were evaluated in terms of need-for-power and project alternatives.

FY 1985 Accomplishments Include:

- Initiated the Cluster Impact Assessment Procedure in three western river basins to address the cumulative impact issue.
- Completed over 700 environmental analyses necessary for issuing licenses and exemptions.
- Participated in approximately 50 meetings, conferences, and workshops with State and Federal agencies, hydro developers, and the public concerning hydroelectric licensing requirements and the Cluster Impact Assessment Procedure.
- Instituted a "generic issue" tracking and monitoring system to analyze projects delayed beyond normal processing times and to help resolve associated issues.
- Completed 310 design, economic, and project safety reports necessary for project licensing.
- Collected $3,918,000 for headwater benefits payments to the United States Treasury.
- Approved an innovative relicensing settlement which grants the license to the original licensee for 30 years and transfers ownership of the project to the competing applicants for the remaining 20 years of the license.
- Developed public environmental assessment procedures for processing license and exemption applications.
- Provided recommendations on hydropower installations at 10 projects proposed by other Federal agencies.

Hydropower Licensing Trends

Four major workload areas constitute the highest priority programs in the hydropower licensing program--new capacity hydropower licenses and amendments to new capacity licenses, preliminary permits, and exemptions from licensing.

The number of applications for new capacity hydroelectric projects and amendments to new capacity licenses has risen throughout the 1980's. Applications for these projects totalled 324 in FY 1985, as compared to only 25 in FY 1979. In FY 1985, pending workload in new capacity applications increased by 20 percent to almost 550 cases. Much of this increase is attributable to increased applications in the last quarter of the fiscal year because of the energy tax credit expiration deadline of December 31, 1985. This effect should continue through the first quarter of FY 1986. Receipts are expected to reach 223 in FY 1986 while the number of applications for new capacity projects should decline to 168 in FY 1987. This number would still represent a continuation of the long-term trend of greater interest in developing hydropower.

Applications for preliminary permits have increased significantly beginning in FY 1981, indicating a future increase in license applications. Since preliminary permits can be granted for up to three years for study of potential hydropower sites, approximately 30 percent of the 785 permits issued in FY 1984 and FY 1985 will result in applications for new capacity and exemptions in FY 1987.

Unlike license applications, the number of applications for exemption from licensing is declining. In FY 1986, exemption applications are expected to total 120, and by FY 1987 should fall to 80. These totals compare to a high of 475 applications in FY 1982 and 172 received in FY 1985.

The overall workload of the hydropower licensing program is shown in Table 15. Total receipts for FY 1987 are estimated to be 1,549, a nine percent decrease from FY 1986. In FY 1986 and FY 1987, amendments of licenses will surpass preliminary permits as the workload category with the largest number of applications. This trend is also projected for future workload. While new workload associated with the processing of preliminary permits and exemptions is expected to decrease, there are still significant and continuing responsibilities for complex and staff-intensive applications involving the licensing of new capacity projects.

These complex new capacity applications also require preparation of comprehensive environmental documents that fully consider the environmental impacts associated with approval of an application. In addition, Tulalip has shifted many previous exemption applications into the new capacity category.

FY 1987 Request:

The Commission is requesting $20,745,000 to carry out the activities of the hydropower licensing program. The resources requested will allow for the completion of 250 license applications and amendments to licenses for new capacity hydroelectric projects in FY 1987, a 15 percent increase from FY 1986 and nearly 8 percent more than FY 1985. The overall pending workload is projected to decline from FY 1986 levels by 187 or 15 percent. This request also includes funding of $3.1 million for required environmental analysis work. In November 1985, the Commission opened a new regional office in Portland, Oregon.

The Portland Office was established in response to the growing interest in hydropower development in the Northwest and will enhance the Commission's ability to respond to hydropower developmental and operational issues in the area, including environmental concerns.

Table 15 - Hydropower Licensing Workload

	Receipts			Completions		
	FY 1985	FY 1986	FY 1987	FY 1985	FY 1986	FY 1987
Major Hydroelectric Licenses:						
Constructed	4	4	4	5	4	4
New Capacity (Formal)	3	3	3	4	3	3
New Capacity (Non Formal)	151	120	100	116	110	124
Relicense (Formal)	0	2	2	4	1	1
Relicense (Non Formal)	15	8	2	6	15	15
Minor Hydroelectric Licenses:						
Constructed	5	3	3	4	5	5
New Capacity	138	75	50	93	84	100
Relicense	4	0	4	2	3	1
Surrender	14	5	5	10	5	5
Transfer	39	30	30	31	30	30
Amendment to License	533	550	600	472	500	550
Amendment (New Capacity)	32	25	15	19	20	23
Preliminary Permit	636	500	400	787	565	500
Transmission License	2	1	1	1	2	1
Declaration of Intention	9	6	6	7	7	8
Non-Project Use of Lands	42	30	30	35	30	30
Exemptions from Licensing (5 MW or less)	122	80	50	188	100	90
Exemptions: Conduit	50	40	30	43	40	30
Power Site Use Letters	36	30	30	42	30	30
Vacation/Determination	270	160	160	296	160	160
Geothermal Steam Lease	33	10	10	30	10	10
Headwater Benefit Investigations	20	14	14	17	16	16
Total	2,158	1,696	1,549	2,212	1,740	1,736

Table 16 - Workload Pending at End of Fiscal Year

	FY 1984	FY 1985	FY 1986	FY 1987
Major Hydroelectric Licenses:				
Constructed	17	16	16	16
New Capacity (Formal)	4	3	3	3
New Capacity (Non Formal)	277	312	322	298
Relicense (Formal)	5	1	2	3
Relicense (Non Formal)	32	41	34	21
Minor Hydroelectric Licenses:				
Constructed	9	10	8	6
New Capacity	144	189	180	130
Relicense	2	4	1	4
Surrender	2	6	6	6
Transfer	7	15	15	15
Amendment to License	80	141	191	241
Amendment (New Capacity)	30	43	48	40
Preliminary Permit	519	368	303	203
Transmission License	1	2	1	1
Declaration of Intention	6	8	7	5
Non-Project Use of Lands	7	14	14	14
Exemptions from Licensing (5 MW or less)	150	84	64	24
Exemptions: Conduit 1/	11	18	18	18
Power Site Use Letters	7	1	1	1
Vacation/Determination	38	12	12	12
Geothermal Steam Lease	0	3	3	3
Headwater Benefit Investigations	7	10	8	6
Total	1,355	1,301	1,257	1,070

1/Workload included as part of exemptions: 5MW or Less Category prior to FY 1984.

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
Dam Safety Inspection: Operating Expenses	$7,891	$8,789	$8,598

Goals of the Dam Safety Inspection Program:

- Ensure that licensed projects are inspected in the construction, operation, and maintenance phases for the protection of life, health, and property.
- Ensure compliance with licenses, exemptions, and preliminary permits.

Specific Objectives for FY 1987:

- Conduct planned operation, construction, prelicense, exemption, recreation, and special inspections.
- Implement dam safety measures in compliance with FERC rules and regulations.
- Ensure the overall supervision of licenses for compliance with their terms and applicable regulations.
- Maintain and improve the Hydro License Compliance Tracking System to ensure compliance with licenses, preliminary permits, and exemptions.

Productivity Standards

- Improve productivity by 6 percent from FY 1985 levels.

The FERC, under Section 10(c) of the FPA, is responsibile for the inspection of more than 2,000 dams. To this end, the dam safety inspection program ensures that licensed projects are constructed, operated, and maintained in accordance with approved plans, license conditions, and sound engineering practices.

A second element of this program requires licensees and applicants to submit an emergency action plan, which is designed to provide early warning to upstream and downstream inhabitants, property owners, operators of water-related facilities, recreational users, and other persons in the vicinity who might be affected by a project emergency. The plans provide local authorities with emergency measures crucial to the orderly evacuation of all residents located in the immediate area. Emergency action plans are reviewed annually by staff and periodic tests are conducted by the dam owners to ensure adequacy.

The responsibility for inspection of dams under the Commission's jurisdiction has increased by 48 percent as the result of the large number of licenses and exemptions issued in the past four years for construction of new capacity and exempted hydroelectric projects.

Therefore, the workload requirements on FERC inspecting engineers are continuing to increase. Increased productivity by the FERC inspecting engineers and streamlining of inspection reports have enabled the inspection staff to accomplish more inspections without increases in staff. Following are descriptions of the various types of dam safety inspections conducted.

Prelicense Inspections

A prelicense inspection is made on a project with a constructed dam whose license application is pending in order to verify that the application conforms with existing regulations and that the exhibits filed with the application accurately describe the existing facilities. These constructed projects are inspected biennially after the initial inspection. An inspection report is completed which includes comments on the following: plans for redevelopment; plans of provisions for increases in capacity; recreation use and potential; and any other matters of interest to the Commission. In FY 1987, 88 prelicense inspections will be completed.

Construction Inspections

These inspections are made on licensed projects which are under construction. Major projects are normally inspected once a month; however, more frequent inspections are made when unusual problems are encountered and less frequent inspections are made during periods of work interruption, winter slowdown, or when the nature of construction indicates that less frequent inspections are needed.

When performing construction inspections, the inspecting engineer assures that all the provisions of the license, license exhibits, contract plans, and specifications are being complied with. The inspecting engineer also verifies the employment of sound construction and quality control practices and whether appropriate records are being maintained for the projects. The inspecting engineer travels to the site to review work progress. These inspections include assessments of: (1) excavation for tunnels, structures, and roadways; (2) embankment, concrete, and other materials placed; (3) installation of major machinery and equipment; (4) reservoir clearing; (5) necessary relocations; and (6) installation or construction of recreation, fish, and wildlife facilities. Inspecting engineers also review foundation conditions, foundation preparation, and the type of material and conditions of placement. Another concern is quality control practices. The inspecting engineer carefully observes and describes in his inspection report the quality of material used and the work performed; any deficiencies are promptly reported to the licensee. Additionally, the inspecting engineer brings to the attention of the licensee any safety hazards and noncompliance with special conditions of the license including those relating to recreation, fish and wildlife resources, and other environmental concerns.

The issuance of a license for an unconstructed major new capacity project has a much greater impact on the Dam Safety Inspection workload than the issuance of a license for a constructed project due to the frequency of inspections necessary. The Commission proposes to complete 426 construction inspections in FY 1987, which is a 13 percent increase over the number completed in FY 1985.

Exemption Inspections

This program was initiated in FY 1981 in an effort to speed up the licensing process and eliminate the necessity to license some small hydropower projects. An inspection is completed when an application is initially filed to verify if additional dam safety and environmental provisions are needed in a case-specific exemption order. In addition, these inspections will verify the exemption status of a project. At least two follow-up inspections are made on such projects. The first follow-up inspection is made during construction and the second after completion of the project. Subsequent inspections may be made for dam safety reasons. The Commission estimates that 284 exemption inspections will be completed in FY 1987.

Special Inspections

These inspections are made whenever an emergency or unusual situation occurs. Emergencies include earthquakes, slides, or even a significant change in a seepage condition. The Commission estimates that special inspections for FY 1987 will total 90.

Compliance

Because of their proximity, the regional offices are in regular contact with owners of licensed projects. The five FERC regional offices are responsible for ensuring that licensees, permittees, and exemptees comply with the requirements of orders and regulations issued by the Commission. If any owner of an existing or proposed hydroelectric project does not comply with the terms of Commission orders or regulations, the regional office staff initiates action to enforce compliance. The regional office staff makes all effort to resolve these items expeditiously, working with the licensees to settle such matters quickly and without the need for Commission action. The majority of non-compliance items are satisfactorily brought into compliance in this manner. However, in those instances where owners are not diligent in carrying out their responsibilities, and staff is unable to resolve such matters, they are referred to the Commission's Office of the General Counsel for instituting legal action.

Operations Inspection

Projects that have been licensed by the Commission and are in operation are inspected on a one-year to three-year schedule to verify that (1) they are properly maintained to ensure the continued integrity of the structures; (2) no unauthorized modifications have been made to the projects; and (3) the projects are being operated in compliance with the terms of the license. High-hazard and significant-hazard projects are inspected annually while low-hazard projects are inspected triennially. Commission inspecting engineers examine the project for any appreciable water seepage, deterioration of the structures, unusual overflow conditions due to floods, and major damages to the project works resulting from floods.

Project structures are classified into two major categories: earth dams and concrete dams. The inspecting engineers, when reviewing earth dams for safety, give particular attention to evidence of the movement of materials at the toe of the dam, to evidence of dampness on the downstream part of the dam, and to erosion. With respect to a concrete dam, particular attention is given to the condition at the abutments, noting whether there is any appreciable leakage or deterioration, and whether the drains are operating satisfactorily. Inspecting engineers also examine the concrete on the face of the dam, checking for any appreciable spalling, cracks, or other deterioration, and for leakage through or under the dam. In addition, the inspecting engineer reviews whether the conduits and powerhouse of the concrete structure have become impaired due to erosion, seepage, deterioration, settlement, or other causes.

During the course of these inspections, important safety matters are immediately brought to the attention of the licensee by the inspecting engineer in order to expedite required corrective measures. For FY 1987, an estimated 900 inspections of operating facilities will be completed. This is an increase of 17 percent over the completions in FY 1985.

A critical part of the inspecting engineer's duties when conducting an operation inspection is to ensure that emergency action plans are properly maintained and can be readily implemented if an emergency occurs.

Consultant Inspection Reports

Commission regulations require that a licensed dam over 32.8 feet in height or impounding a reservoir containing more than 2,000 acre-feet of water be inspected at five-year intervals by an independent consultant to identify deficiencies that might endanger the public. The inspection report which is prepared by the consultant delineates any current or potential deficiencies in the condition of project structures, quality and adequacy of maintenance, or methods of operation and ability to pass floods. Specifically, the consultant reviews and assesses data relating to settlement, movement, erosion, seepage, leakage, cracking, seismicity, internal stress and hydrostatic pressures in structures, foundation drains and relief wells, and the stability of critical slopes adjacent to the reservoir or project structures. The FERC dam safety inspection staff must then review the independent consultant inspection reports for adequacy and possible follow-up action associated with the consultant's recommendations. Staff anticipates a review of 100 consultant inspection reports in FY 1987.

FY 1987 Request:

The Commission is requesting $8,598,000 to carry out the activities of the dam safety inspection program in FY 1987. At the beginning of FY 1984, there were 1,120 developments under license; the number of developments will increase to about 1,337 by the beginning of FY 1987. In FY 1985, 1,721 dam safety inspections were completed, 1,738 are anticipated in FY 1986, and 1,788 in FY 1987. Table 17 shows the estimated activity for each of the five types of dam safety inspections.

Table 17 - Dam Safety Inspection Workload

	Receipts			Completions		
	FY 1985	FY 1986	FY 1987	FY 1985	FY 1986	FY 1987
Operation Inspections	768	850	900	768	850	900
Prelicense Inspections	146	88	88	146	88	88
Construction Inspections	377	426	426	377	426	426
Exemption Inspections	282	284	284	282	284	284
Special Inspections	148	90	90	148	90	90
Total	1,721	1,738	1,788	1,721	1,738	1,788

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

OIL PIPELINE REGULATION

Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
Oil Pipeline Regulation - Operating Expenses	$4,034	$3,782	$4,139
Staff Years	65	65	70

Authorization:

Oil Pipeline Regulation: Interstate Commerce Act; Department of Energy Organization Act; Regulatory Flexibility Act; Outer Continental Shelf Lands Act; Crude Oil Windfall Profit Tax Act; and the Deepwater Port Act.

Goals of the Oil Pipeline Regulation Program:

- Ensure that shippers and consumers are not adversely affected by unjustifiably high tariffs.
- Maximize recovery of north slope oil at the most economic level.

Specific Objectives for FY 1987:

- Reduce regulatory burden and streamline processing.
- Complete all remaining 1983 annual and basic valuations for common carrier oil pipelines.
- Review and decide all initial rate filings within the 10-day statutory period and all other tariff filings within 30 days.
- Resolve formal tariff filing suspension cases.
- Administer the Uniform System of Accounts and a program of financial audits.
- Administer an effective enforcement program.

Productivity Standards:

- Achieve a productivity increase of 5 percent over FY 1986.

The Commission's responsibilities in the oil pipeline regulation program extend to approximately 150 common carrier oil pipelines. Given our Nation's position as the world's largest consumer and third largest producer of crude oil, we continue to be faced with enormous requirements for crude oil which must be transported through various pipeline delivery systems. The Commission's responsibilities concerning the transportation of crude oil include establishment of transportation rates that are fair to shippers and consumers and that also supply adequate incentives for the expansion of oil pipeline systems. This responsibility for determining oil pipeline rates, including the investigation of the Trans Alaska Pipeline System (TAPS) rate case and conducting valuations, was transferred to the FERC from the Interstate Commerce Commission (ICC) under the Department of Energy Organization Act of 1977. The oil pipeline regulation program is divided into five primary functions: (1) tariffs and rates, (2) valuations, (3) depreciation reviews, (4) TAPS, and (5) financial audits.

Tariffs and Rates

Tariff and rate changes are filed with the Commission by approximately 150 oil pipelines for the transportation of crude oil and petroleum products. These filings are statutory 10-day or 30-day filings. Pursuant to Opinion 154-B, which deals with the proper methodology for regulating oil pipeline companies pursuant to the court decision (Farmers Union Central Exchange et.al. vs FERC), a determination of just and reasonable rates is required on a case-by-case basis for filings with rate implications. It is the responsibility of staff to review each oil pipeline rate tariff filing for compliance with the ratemaking methodology set forth by the Commission. Filings that cannot be fully analyzed within the 30-day statutory notice period will be suspended for one day subject to refund pending further action by the Oil Pipeline Board upon completion of staff analysis. The Opinion 154-B methodology will entitle certain pipelines to rate increases and those companies are expected to be among the first to file. The majority of the initial filings are expected to have insufficient justification to complete analysis within the 30-day statutory notice period. In most cases, an order will have to be issued requiring the company to submit justification in support of its rates comporting with the methodology set forth in Opinion 154-B. The burden of proof will be on the company and staff will review and analyze the justification for conformance with Opinion 154-B and the appropriate level of resulting revenues. Tariff filings will either be accepted, rejected or found to be not just and reasonable and not in compliance with the Opinion 154-B by the Oil Pipeline Board. Should the Board suspend a case and set it for formal investigation, the formal cases will then be completed by order of the Commission following formal proceedings. The procedures for processing these cases require development of a transition rate base, trended original cost of equity, individual company rate of return and tax normalization which considers capital structure on a case-by-case basis. This procedure, under Opinion 154-B, is completely new and requires a more lengthy and complex staff analysis. Moreover, the time required to complete a case may be extensive during the transition year of FY 1986 as the procedures are new and unfamiliar to the companies. Staff expects many cases will require information requests for supporting data as well as the use of protective orders to obtain proprietary data. Rate of return expertise will be relied on heavily during FY 1986 and FY 1987 to establish the initial rates of return under the revised methodology.

Non-rate tariff filings include rules, tariff changes, wording changes in rate tariffs with no change in rates, cancellation notices, tariff indexes, addition and deletion of destination and delivery points, suspension supplements, adoption notices and adoption supplements. The filings will be accepted if they are in compliance, rejected for non-compliance with regulations, or transferred to the formal category where protests raise discriminatory issues. Fourth and Sixth Section applications are requests for relief from certain Interstate Commerce Act requirements to allow the applicant to adjust either service or tariff regulations in order to meet competitive demands. These requests require staff analysis over and above the normal non-rate type of filings and generally must be acted on rather quickly.

Increased competition with other fuels, e.g., natural gas, has discouraged the filing of rate increases. Consequently, the total number of filings has declined significantly in recent years. The number of filings has stabilized and, absent a dramatic change in the supply or price of world oil supplies, should continue at approximately the current level. Accordingly, a receipt level of approximately 1,300 non-rate and rate-related tariff filings is expected annually. Formal tariff proceedings have been less than anticipated for the last two years for two additional reasons: (1) the Commission was deliberating on the methodology to use in its pipeline ratemaking, and (2) lower oil prices and increased competition have discouraged the filing of rate increases.

On March 9, 1984, the District of Columbia Circuit Court of Appeals reversed and remanded the Commission's decision in the Williams Pipe Line Company rate proceeding. This proceeding has been designated a "lead case" for the purpose of determining a ratemaking methodology for the oil pipeline industry. In its opinion, the Commission determined that a "light-handed" regulatory approach was appropriate, that it would only institute rate investigations upon protest by outside third parties, and finally, that its staff would only participate in their investigations when unique or innovative issues with industry-wide impact were presented. In line with this "light-handed" approach, the Commission transferred resources to other program areas and currently maintains a relatively small staff to implement its oil pipeline regulation program.

In the D.C. Circuit Court's remand, the Court determined that the Commission should be able to issue a new opinion within twelve months, or July 7, 1985. On June 28, 1985, the Commission issued Opinion No. 154-B in compliance with the Court's mandate. In the opinion, the Commission determined that a trended original cost methodology was appropriate for the oil pipeline industry. Application of this methodology would be based upon a starting rate base for each individual carrier. This starting rate base would be determined on the basis of a formula set out in the opinion and has as its foundation the capital structure of the corporate entity that actually secures debt financing, or guarantees debt financing. Rate of return would be determined on a company specific basis and the equity portion of the rate of return would be a "real," as opposed to a "nominal," rate of return.

This "real" equity rate of return would be determined on the basis of the risks faced by the pipeline company. In addition, to accomplish its statutory duty to regulate oil pipeline companies, the Commission reversed an administrative finding in Opinion No. 154 and stated that Commission staff would participate in any investigation ordered by the Oil Pipeline Board or the Commission.

Applications for rehearing and clarification of Opinion No. 154-B were filed in July 1985. These applications for rehearing address every substantive determination in Opinion 154-B, including the area of staff participation. Due to the substantial nature of these applications for rehearing, the "ground rules" by which the oil pipeline industry will be regulated remain unclear until an order addressing the merits of the rehearing petitions is issued. This order should be issued during the first half of FY 1986. If the Commission affirms its decision in Opinion No. 154-B that staff will participate in investigations, it will be necessary to assign additional resources to the oil pipeline program area to implement the new regulatory approach. These resources will be obtained by assigning personnel from natural gas program areas.

Valuations

Common carriers must submit data so that a basic valuation covering the assets devoted to common carrier operations can be computed. Annual valuations are yearly updates of the basic valuations. These updates reflect current reproduction costs, and this annual updating trails the Commission's budget year by about two years. For example, in FY 1985, annual valuations for CY 1983 were done. Traditional oil pipeline ratemaking, which this Commission inherited from the ICC and determined was appropriate in its Opinion No. 154, which was reversed by the D.C. Circuit Court of Appeals, used these updated valuations to determine the reasonableness of oil pipeline rates. Although the valuation approach to ratemaking was abandoned by the Commission in its Opinion 154-B, the opinion requires the use of the 1983 annual valuation to compute a starting rate base. Although the 1983 annual valuation exercise has essentially been completed, there are some residual studies that remain to be completed for a variety of reasons. Since Opinion 154-B requires a 1983 annual valuation to determine a starting rate base for those assets devoted to common carrier operations as of June 28, 1985, these residual studies will have to be completed to ensure that intramodal competition, where it exists, is conducted under the same ratemaking methodology. It is estimated that this cleanup exercise will be completed during FY 1987.

Under the Interstate Commerce Act, the Commission is required to determine an initial or basic valuation for assets devoted to common carrier operations. In Opinion No. 154-B, the Commission determined that for assets devoted to common carrier operations prior to June 28, 1985, a transition rate base established by the 1983 annual valuation would be utilized and that for assets devoted to common carrier operations after June 28, 1985, a trended original cost rate base would be utilized. The Commission has an existing backlog in its basic valuation program and this backlog will have to be cleaned up. It is estimated that this cleanup exercise will be completed during FY 1987. When the existing backlog in the annual and basic valuations are completed, valuation personnel will be transferred to other oil pipeline activities, principally in the formal rate and depreciation area.

In the past, the FERC annually reviewed valuations amounting to approximately $10 billion for the lower 48 states. To assist in the annual collection and analysis of cost data used in annual valuations, the FERC has established a Petroleum Pipeline Advisory Committee on Valuation. The committee was comprised of representations from oil pipeline companies and third-party shippers. Under Opinion No. 154-B, this committee is no longer needed and will be used only during the remaining term of its charter, which expires in FY 1986.

Under provisions of the Interstate Commerce Act, the Commission is required to determine an initial or basic valuation for all assets devoted to common carrier operations. Since the Commission has abandoned the valuation methodology for assets devoted to oil pipeline common carrier operation after June 28, 1985, this statutory requirement would require the Commission to devote resources to a wasteful and useless exercise. The Commission will submit a suggested amendment to Section 19a of the Interstate Commerce Act to remove oil pipeline common carrier properties, devoted to interstate commerce after June 28, 1985, from this requirement of the Act.

Depreciation Reviews

Oil pipeline companies must depreciate their assets based on rates established by the Commission. The FERC develops and establishes depreciation rates applicable to the original cost of property. Since depreciation represents a significant portion of the total operating expenses of a company, it has a direct impact on the company's net income. Therefore, the staff must retain an extensive data base for each company. Depreciation rates are presently reviewed on a seven-year cycle. In FY 1987, it is projected that 26 depreciation reviews will be completed.

Financial Audits

Through a financial audit program, the Commission administers the Uniform System of Accounts. Financial audits of the books and records of new oil pipeline carriers and pipeline systems are performed to ensure that the financial information filed with the Commission complies with its regulations and that the original cost of carrier property for ratemaking and valuation purposes is properly stated. In FY 1987, 10 financial audits will be completed.

Oil pipeline audits performed during FY 1982 through FY 1985 have been limited to those new carriers that require an initial valuation under Section 19a of the Interstate Commerce Act.

Certain modifications must be made to the accounting requirements contained in the Uniform System of Accounts to reflect the ratemaking principles set forth in Opinion No. 154-B.

A continuing program of compliance audits is necessary in order to provide assurances to staff and to the Commission that the oil pipelines are properly following the principles of original cost ratemaking and that the operating expense accounts are consistent with the Commission's accounting requirements.

FY 1985 Accomplishments Include:

- The two-part hearing on TAPS on all non-cost of construction issues was completed.
- The fourth part of a four-part hearing on TAPS on the cost of construction issue was completed.
- A contested settlement of all issues in TAPS was certified to the Commission on August 9, 1985. This settlement, as to the non-contesting parties, was approved on October 23, 1985. An expedited hearing was established to determine whether the settlement methodology should be applied to the contesting parties.

Oil Pipeline Regulation FY 1987 Request:

The Commission is requesting $4,139,000 to carry out the activities of the oil pipeline regulation program in FY 1987. For FY 1987, it is projected that 1,597 workload items will be completed in the oil pipeline regulation program. Table 18 shows FY 1985 - FY 1987 receipts and completions for the program.

Table 18 - Oil Pipeline Workload

	Receipts			Completions		
	FY 1985	FY 1986	FY 1987	FY 1985	FY 1986	FY 1987
Tariff Filings - Formal Rates 1/	22	175	250	40	185	260
Tariff Filings - Rates 2/	884	750	750	891	500	750
Tariff Filings - Non-Rates 3/	21	500	500	23	500	500
Basic Valuation	4	19	15	9	22	26
Annual Valuation	75	26	22	124	35	25
Depreciation Order	20	24	26	20	24	26
Financial Audits	1	15	10	4	13	10
Total	1,027	1,509	1,573	1,111	1,279	1,597

1/ Workload combines TAPS and tariff formal categories.

2/ Workload prior to FY 1986 represents tariff filings.

3/ Workload prior to FY 1986 represents 4th and 6th section applications.

Table 19 - Workload Pending at End of Fiscal Year

	FY 1984	FY 1985	FY 1986	FY 1987
Tariff Filings - Formal Rates	182	164	154	144
Tariff Filings - Rates	12	5	255	255
Tariff Filings - Non-Rates	3	1	1	1
Basic Valuation	19	14	11	0
Annual Valuation	61	12	3	0
Depreciation Order	20	20	20	20
Financial Audits	0	0 1/	2	2
Total	297	216	446	422

1/ Reflects increase of three in pending workload at the start of FY 1985 for financial audits due to a change in internal processing procedures.

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

ELECTRIC POWER REGULATION

Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
Electric Power Regulation-Operating Expenses	$20,821	$20,849	$20,423
Staff Years	337	335	334

Authorization:

Electric Power Regulation:	Federal Power Act; Public Utility Regulatory Policies Act; Powerplant and Industrial Fuel Use Act; Department of Energy Organization Act; Energy Security Act; Regulatory Flexibility Act; Crude Oil Windfall Profit Tax Act; Pacific Northwest Electric Power Planning and Conservation Act; Flood Control and River and Harbor Acts; Bonneville Project Act; Eklutna Project Act; Falcon and Amisted Dam Act; Federal Columbia River Transmission Act; Reclamation Project Act; Nuclear Waste Policy Act; National Environmental Policy Act; and the Public Utility Holding Company Act.

Goals of the Electric Power Regulation Program:

- Establish just and reasonable rates for the transmission and sale for resale of electric power by public utilities in interstate commerce.
- Ensure that rates charged by Federal power marketing administrations conform to statutory requirements.
- Promote efficient performance of electric utilities.
- Encourage the development of small power production and cogeneration facilities.
- Exercise approval authority over mergers, consolidations, and interlocking directorates and other transactions.

Specific Objectives for FY 1987:

- Process all applications within statutory time limits.
- Reduce regulatory burden and streamline processing.
- Develop further generic rulemakings on electric ratemaking issues to reduce case-by-case litigation.
- Administer the Uniform System of Accounts and a program of financial audits.

Productivity Standards:

- Reduce pending workload by 53 items from FY 1985, a reduction of 11 percent.
- Maintain a productivity level consistent with adjustments for increased complexity of workload particularly in the formal investigations area.

Commission Jurisdiction

The Federal Power Act requires the FERC to establish just and reasonable rates for wholesale electric sales and the transmission of electric energy in interstate commerce. The wholesale sales transactions are divided into two distinct categories, requirement sales and coordination sales. Requirement sales involve a long-term commitment to provide firm power to meet all or part of the buyer's load. Coordination transactions, on the other hand, involve the sale or exchange of electricity between utilities that normally have sufficient generation to meet their own loads. Coordination sales generally are shorter and less firm than requirement sales.

The volume of coordination sales is growing rapidly. Thus, power purchased at wholesale is becoming more important as a source of supply for the electric power delivered to ultimate consumers. Nationwide, power purchased at wholesale provides about a third of the supply of electricity for sales to ultimate consumers.

The Commission also:

- Reviews agreements for the interconnection of utility systems and transfer of power among utilities;
- Has authority over mergers, acquisitions, and sales of facilities of regulated utilities and certain issuances of utility stock;
- Has authority over certain interlocking relationships between top utility officials and certain firms doing business with these utilities;
- Is responsible for ensuring that rates charged by DOE's power marketing agencies comply with statutory standards and standards developed by the Secretary of Energy; and
- Processes applications pursuant to PURPA for qualifying status as a cogenerator or small power production facility.

Regulatory Changes

During the past ten to fifteen years, the electric power industry has been in a state of transition. While the industry as a whole has grown to keep pace with demand and remains financially stable, a number of utilities generally involved with large construction projects have met with costly delays and financial difficulties. In some cases, individual utility companies may have to absorb rather than collect through rates some or all of the costs of unfinished plants and plants not fully cost justified. As a result, regulation of the electric industry has become extremely more complex than it was just five years ago. This has forced the FERC to take a new look and a fresh approach as to how it regulates the utilities and how it considers the many different types of issues the industry faces and which FERC must address in its ratemaking process. Three of the most pressing issues which have come to the forefront in recent years include:

- soaring construction costs for both fossil and nuclear plants;
- uncertain future power needs;
- cancellation and delay of power plants already under construction;

To respond to these issues, the Commission issued a new Construction Work in Progress (CWIP) rule in 1983. Under this rule, a utility must demonstrate that costs have been prudently incurred pursuant to a long-term, least-cost supply program in order to include the CWIP in the rate base and earn a return on the CWIP. Thus, the FERC may review the prudence of constructing new generating capacity as costs are incurred, rather than after a project has been completed. In evaluating the cancellation of power plants, the Commission has relied on precedent established in New England Power Co., Northern States Power Co., and New England Power Co.,. Recently, however, the U.S. Court of Appeals for the District of Columbia Circuit vacated and remanded to the Commission the CWIP rule in Mid Tex Cooperative, et. al., v. FERC et. al (September 24, 1985). The Commission is reviewing the Court of Appeals decision to determine what course of action to take.

These new issues have generated increasingly complex filings. This is particularly true in the formal rate investigation area where most staff effort is now required to process cases. First, due to rising construction costs and the uncertain future power needs, more intervenors are filing comments and testimony resulting in more staff being required to consider all aspects of a rate filing. Second, these new issues of prudency and excess power generation are case specific and must be handled on a case-by-case basis. And third, although speeding up the processing of cases, the expedited procedures established by Rule 717 require more staff effort for review and preparation of testimony than may have been needed under prior procedures.

In the last few years the Commission has also taken a number of innovative steps designed to encourage efficiency. For example, the fuel clause regulations were changed to allow a utility that buys bulk power to pass capacity charges through its fuel clause in certain circumstances. The old regulations created a bias against buying power that included a capacity charge -- even if that power was cheaper than alternative power without a capacity charge. The FERC is also conducting an experiment involving six utilities in Arizona, New Mexico, and

Texas to test whether enhanced competition and increased coordination can improve efficiency. These six utilities have agreed to provide wheeling service to each other for two types of bulk power which means that any participating utility can "shop around" for the cheapest power available and have it wheeled from the seller. The FERC has given the six utilities considerable pricing freedom, including retaining a portion of the profits arising from increased economy transactions. Increased exchanges of power among the utilities should result in lower prices for their customers and increased dividends for their shareholders. In September, 1983, the Commission contracted for and published a major report on incentive regulation titled "Incentive Regulation in the Electric Industry" and is reviewing the report's recommedations. A recent survey shows that regulatory commissions in 36 states have adopted some kind of incentive programs.

The Commission has also issued two Notices of Inquiry -- one for coodination transactions, including wheeling, and one for requirements service -- to evaluate how its policies promote or impede efficiency in electricity markets. Through these inquiries the Commission seeks to determine whether there are alternatives to, or revisions of, its policies which would further promote efficiency in the electric utility industry.

Since changes in Commission policy and the subsequent changes to rules and regulations have a far reaching impact on the electric power industry, the Commission must be able to respond to these increased demands in a timely and efficient manner to meet its responsibilities under the FPA.

The following describe the major elements and the Commission's responsibilities for the Electric Power Regulation Program.

Rate Filings

As authorized by the Federal Power Act, the Commission acts on filings to establish or change the rates, terms, and conditions for the transmission or sale at wholesale of electric energy in interstate commerce. To expedite the process, the Commission has delegated authority to the staff to act on certain routine and noncontroversial applications. More than 85 percent of the rate filings are completed through these delegations.

As a result of a decline in load growth, most utilities today are faced with excess capacity. Revenues derived from sales of that excess capacity, through coordination transactions, can be used to reduce rates to requirements customers. As a result of the large quantities of excess capacity, utilities have become more aggressive in their attempts to market that power. Accordingly, the number of rate filings involving coordination transactions has continued to grow. As the market for bulk power has become more competitive, innovative approaches to marketing that power have evolved. Thus, not only has the number of coordination transaction filings increased, but the complexity has increased as well.

The Commission may suspend a proposed rate increase for up to five months and order that the rates be collected subject to refund. For those rates which appear to be excessive, an investigation is initiated which may result in a formal hearing before an administrative law judge. A settlement conference is scheduled to permit staff, the utility, and the affected wholesale customers to resolve differences and arrive at mutually acceptable terms. If settlement attempts are unsuccessful, the matter then goes to an evidentiary hearing for which the staff prepares testimony and appears for cross-examination. The Commission may order refunds, if appropriate, as a result of the hearing or settlement process.

More than 80 percent of the suspended rate increase filings submitted in Fiscal Years 1982, 1983, and 1984 were resolved through the settlement process. Requests for rate increases totalled approximately $730 million in FY 1982, more than $480 million in FY 1983 and $431 million in FY 1984. During FY 1982, FY 1983, and FY 1984 rate increase requests for approximately $650 million, $340 million, and $296 million respectively, were suspended, made subject to refund, and set for hearing. Projections for FY 1986 and FY 1987 indicate that rate increase requests will amount to $550 million each year.

During FY 1983, the Commission modified its regulations concerning the inclusion of CWIP in electric rates. The CWIP rule permits utilities to reflect more accurately the cost of providing power and is intended to remove certain impediments that would discourage construction of needed generation facilities. This rule enables the Commission to review the prudence of utility construction programs earlier than was the case before the rule. As noted earlier, this rule has been vacated and remanded to the Commission for further consideration.

Corporate Applications and Interlocking Positions

The Commission is responsible for reviewing and responding to applications related to corporate transactions including mergers, property disposition and acquisition, and issuance or acquisition of securities by regulated electric power companies, and for reviewing and responding to applications for authorization to hold certain interlocking positions between a public utility and other business entities. In addition, the Commission is responsible for establishing and maintaining a public record of interlocking positions including certain types not requiring formal applications, and a public file of each utility's 20 largest purchasers of electricity. A final rule was issued in FY 1984 to amend the reporting requirements for an application for authority to hold interlocking positions. This amendment reduces the burden on applicants and streamlines the process for evaluating the applications. A Notice of Proposed Rulemaking in Docket No. RM83-63-000 was issued in FY 1985, to further reduce the burden on both the applicants and staff in processing interlocking applications associated with affiliated utilities. During FY 1986 and FY 1987 it is expected that 95 corporate applications and applications to hold interlocking positions will be reviewed and completed each year; however, this number may be reduced depending on the outcome of the proposed rule in RM83-63-000. A final rule is expected to be issued during the first half of FY 1986.

Federal Rate Reviews

The Commission is responsible for confirming and approving power and transmission rates developed by the five Federal power marketing administrations (PMA). In FY 1985, the Commission received seven PMA filings, including a request by the Bonneville Power Administration for approval of its proposed methodology for making impact aid payments to local governments affected by construction or modification of BPA transmission facilities. In contrast to FY 1984, when the requested rates increased annual PMA revenues by a total of $473 million, rates filed in FY 1985 would actually decrease annual PMA revenues by a small amount. This is attributable primarily to relative stability in the costs of the Bonneville Power Administration. In FY 1984, the Commission issued regulations which clarified the filing requirements and established procedures for the review of rates of Federal power marketing administrations. In addition, the Secretary of DOE redelegated the authority to confirm and approve PMA rate filings other than those of BPA and revised that authority to limit certain of the FERC's policy-making responsibilities.

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Northwest Act) amended the Department of Energy Organization Act and established, by statute, FERC's rate approval authority for the BPA. The Northwest Act specifically authorized the Commission to approve BPA's rates on an interim basis, subject to final approval by the Commission, and to hold formal hearings; to review and approve BPA's methodology for determining the Average System Costs (ASC) of utilities that agree to sell power to BPA under a residential exchange program as well as the rates developed under that methodology; and to review and approve the formula used by BPA to make aid payments to local governments affected by construction or modification of BPA transmission facilities.

The Northwest Act authorized the Commission to review the ASC methodology used to determine rates for exchange sales by utilities to BPA. Between October 1981 and June 1984, approximately 80 ASC rates were filed by eight participating utilities, reflecting retail rate levels in fourteen qualifying state jurisdictions. The Commission found one ASC rate to be inconsistent with the interim methodology and directed the utility to revise the ASC rate accordingly. The remaining ASC rate submittals were accepted for filing subject to refund or other adjustments after issuance of a rule on the ASC methodology.

The final rule (Order No. 337) approving an initial ASC methodology for BPA's power exchange transactions with public utilities became effective in January 1984. On July 25, 1984, the Commission acted on the 80 dockets pending at that time and approved Bonneville's ASC determinations for exchange sales of four investor-owned systems (Pacific Power and Light, CP National Corporation, Utah Power and Light, and Washington Water Power Company) finding that the rates or settlement agreements among the signatories were fair and reasonable and in the public interest. The Commission terminated a number of pending ASC dockets and initiated hearing procedures to address issues still outstanding in the remaining dockets, which were consolidated for hearing on a company-by-company basis. Half of these have been settled. Recommended initial decisions in the other half were issued by an administrative law judge in November 1984 and will be subject to Commission review after exceptions are taken by the parties to the proceeding. Before issuing a final order, the Commission will also consider comments from a Joint State Board, which the Commission is required to convene by Section 9(g) of the Northwest Act to assist the Commission in reviewing ASC rates.

Since June 1984, approximately 25 ASC rates have been filed. The Commission found portions of two ASC rates to be inconsistent with Order No. 337 and directed revisions accordingly. The other rates were either accepted as in compliance with Order No. 337 or set for hearing.

On June 5, 1984, BPA filed a new methodology for determining the ASC and requested an effective date for the revised methodology of July 1, 1984, or, in the alternative, that the methodology be placed in effect on an interim basis. On August 1, 1984, the Commission issued a notice in Docket No. [illegible] in which it indicated that the interim approval was denied. Subsequently, the

Commission granted approval of the methodology by order issued on October 1, 1984. In response to requests for rehearing of that approval, the Commission issued an order on November 21, 1984, granting rehearing solely for the purpose of further consideration; rehearing was denied by order dated February 1, 1985. Approximately 15 ADC rates have been filed under the new methodology as of June 15, 1985.

The Northwest Act provides more rigorous standards and procedures for the Commission's review of rates for non-firm power sold outside of the Northwest region than those required for review of regional rates. Rates have been filed for such non-firm sales for every calendar year since 1981 except for 1983. The hearing on the 1981 and 1982 rates has been completed and an initial decision has been issued which is pending Commission review. A hearing on the 1984 rates was held in September 1985 and the matter is pending before the Administrative Law Judge. The 1985 rates were filed on May 1, 1985, and were approved on an interim basis by the Commission; the need for a hearing is under review.

On September 3, 1985, the United States Court of Appeals for the Ninth Circuit in Southern California Edison Co. v. FERC affirmed in part, reversed in part, and remanded in part, the orders of the Commission which established procedures for the Commission's interim and final approval of non-firm, non-regional rates promulgated by BPA. The Ninth Circuit voided that part of the Commission's final rule which held that the Commission's Rules of Practice and Procedure prohibiting ex parte communications did not necessarily apply to BPA. The Court also voided the Commission's final rule regarding case-in-chief filing requirements. The Court granted the Commission's request to remand for further consideration the question of the appropriate standard of review on non-firm, non-regional rates. These matters are currently under review by the Commission.

Cost of Service Data Filings

The Commission's rules implementing the Public Utility Regulatory Policies Act (PURPA), Section 133, require that certain utility companies are to file cost of service information with the state regulatory agencies to support state regulation of retail electric rates. The utilities involved are required to file information with the Commission, which is charged with establishing the rules for reporting and enforcing compliance with Section 133. Through a series of orders, the Commission defined the specific information required, established a deadline for the final filing, and provided for applications for exemptions from filing. In December 1983, the Commission issued an order reducing the Cost of Retail Electric Service filing requirements pursuant to Section 133. This order decreased both the number of companies required to file and the amount of data collected. As a result, the burden imposed on industry was reduced by 80 percent, or 724,000 hours per year at an estimated annual savings to industry of almost $19 million. In FY 1984, 30 applications for exemption were completed. In FY 1985, 33 applications were completed, but only 15 are anticipated in FY 1986 as the universe of the number of companies eligible for exemption status is reduced. Many utilities not permanently exempted in the December 1983 Commission order have requested permanent exemption.

Small Power Producers and Cogenerators

PURPA provided incentives to improve the Nation's utilization of energy bearing waste and renewable resources and for recovering and using waste heat energy through cogeneration, which is the sequential production of electric energy and useful heat, such as steam. The FERC has issued regulations requiring electric utilities to offer to sell energy to or buy energy from qualifying cogenerators and small power producers at rates and under conditions established consistent with FERC regulations.

The Commission also established the criteria for qualification of facilities and provided procedures under which owners and operators of facilities may seek Commission certification of their qualifying status. Information notices are required from all facilities which claim benefits as qualifying facilities (QF) but do not seek certification. Filings of notices and applications for Commission certification totalled 33 filings during FY 1980, 70 in FY 1981, 249 in FY 1982, 450 in FY 1983, 541 in FY 1984, and 788 in FY 1985. This high level of filings is projected to continue in FY 1986 and FY 1987 when a total of 1,200 filings are anticipated. Completed filings for these two years will also total 1,200; pending workload outside the 90-day processing period will be minimal. Depending on the effects of proposed Federal tax legislation, the number of filings is expected to level off by FY 1987.

The trend has also been toward more cogeneration and fewer small power projects. An increased number of waste energy resources for use in small power production facilities have been identified. Applicants' understanding of the opportunities afforded by the law appears to be increasing. This has resulted in increasingly complex applications requiring more staff effort for analysis and presentation of cases to the Commission. Only a portion of the qualifying generating capacity certified by the Commission will actually be constructed. In FY 1986, a study has been initiated to survey the number and capacity of operating facilities. The addition of generating capacity from these non-utility sources has become an important system planning factor for certain utilities. Staff reviews technical and economic trends in this area to assess the effectiveness of its regulations and to provide guidance as to the need for amendments.

As a result of improved handling procedures to sort, distribute and track incoming QF filings, increased technical staff effort is being directed to application analysis and quicker identification and resolution of specific technical issues associated with applications. In addition, this has also permitted application notices to be issued sooner, thus minimizing the requirement to toll applications which may be contested.

Interconnections and Wheeling

Under Sections 210, 211, and 212 of the FPA, the Commission, upon application or on its own motion, can order the physical connection of the transmission systems of two or more utilities to provide for the sale or exchange of electric power (interconnection) if certain statutory criteria are met. The FPA also authorizes the Commission to order an electric utility to provide transmission service (wheeling) to permit noncontiguous utilities to enter into transactions for the sale or exchange of electric power. Prior to issuing such orders, the Commission must find that the action is in the public interest, and that it will (1) conserve a significant amount of energy; (2) significantly further the efficient use of electric generation and transmission facilities; or (3) improve the reliability of utility electric systems. Furthermore, the FERC must determine that the interconnection order will preserve existing competitive relationships and will not adversely affect reliability, the ability to render adequate service, or result in an uncompensated economic loss for an affected utility. The Commission's desire to foster greater economic efficiency in electric power supply includes concern for the impact of its regulations affecting inter-utility transactions. The Commission has issued a Notice of Inquiry seeking public comments on this matter, and continues to review this important area through special staff studies.

Automatic Adjustment Clauses

Automatic adjustment clauses permit electric utilities to adjust rates to reflect certain cost changes without requiring specific regulatory approval. The most common type of automatic clause is the fuel adjustment clause, which reflects variations from an established base in the cost of fuel burned to generate electricity. Section 208 of PURPA directs the Commission to review, every four years, automatic adjustment clauses used in jurisdictional rate schedules, and to review energy and fuel purchase practices of utilities using such clauses every two years, to ensure efficient use of resources. The required initial two-year review was completed in November 1980 for the utilities under the Commission's jurisdiction, and the second review was completed in FY 1984. The third review was started in FY 1984 with completion targeted in FY 1986, and the fourth review is expected to be initiated in FY 1986 and concluded by the end of FY 1987.

Power Pooling

PURPA requires the Commission to conduct a study on the opportunities for energy conservation, increased efficiency in the use of facilities and resources, and improved reliability available from increased power pooling and coordination; and to report its findings to the President and the Congress. Where such opportunities exist, the Commission may recommend to electric utilities to enter voluntarily into negotiations to capture such opportunities. The Commission is required to report annually to the President and the Congress regarding any such recommendations and subsequent actions taken by electric utilities, the Commission, and by others. The most recent study addressed the effectiveness of economic coordination among utilities in Virginia, North Carolina, and South Carolina, and was completed as a staff report in March 1984. Studies by state regulatory agencies are proposed in Ohio and Indiana.

Bulk Power Experiment

In December 1983, the Commission approved an experimental rate filing from four investor-owned and two public utilities in the Southwest. The filing proposes that utilities will have significant freedom to set their prices. It also includes a commitment by the participating utilities to use their transmission systems so as to allow a competitive market in bulk power to develop. The purpose of this experiment is to see whether a competitive market can be developed which would ultimately result in the generation of electric power more cheaply. The two-year experiment is being conducted to see if such competition generated among the companies would justify modifying FERC's regulation of bulk power sales. The experiment will conclude in FY 1986 and the Commission will be analyzing the results to determine the benefits of the experiment.

The Commission and the utilities are both to contribute to the experiment. The utilities are to contribute by making transmission services available so that any participant can attempt to buy from or sell to any other participant. The Commission is to allow the necessary pricing flexibility essential to the existence of a competitive market, and will permit the utilities to retain some portion of the resulting profits.

Electric Power Analysis

The Electric Power Analysis (EPA) function was established, effective July 15, 1984, by order of the Chairman. The objective of EPA is to provide policy advice and technical assistance to the Commission and to conduct research, analysis and technical support of precedential regulatory issues. Specific activities include consultation on both policy formulation and development and on decisions regarding regulatory policy implementation, analysis of engineering, economic, technological, and policy issues, monitoring major trends and developments in the electric utility industry, studying interconnections, cogeneration, regional power needs, power pooling, and increasing costs of nuclear facilities, and preparing recommendations for treating problem issues.

The method employed to carry out the objectives is through review and evaluation of original data, studies, and reports prepared by the industry, Commission staff, other government offices, and academia and discussions with knowledgeable industry personnel and observers. This method makes best use of the broad experience and evaluation abilities of the staff toward securing timely information and recommendations relevant to the Commission's electric regulatory work.

Issues and topics under examination in FY 1985 include the following:

- Impact of increasing non-utility QF generation on electric utility planning and operation;
- Economic benefits to be derived from improvements in the various classes of power exchanges;
- The feasibility of measures, physical, technical and/or regulatory that are likely to secure the greatest benefits for rate payers and/or stockholders;
- The likelihood of increased electrical end use efficiency, which could hold load growth significantly below GNP growth for some years.

Important issues of near term regulatory concern which are proposed for study in FY 1986 and FY 1987 include the following:

- Possible changes in utility capital expenditures as a result of lower load growth and utilities uses of the high cash flows of the late 1980's;
- Identification of the effect of the reduced need for new generating plants on the generation equipment industry; U.S. utilities use of offshore suppliers when generation plant construction resumes;
- Forecasts of the future trend in type of generation equipment ordered, in view of greater risks perceived by utilities and the likely effect on power costs;
- Large rate increases due to construction cost overruns and construction delays on nuclear power plants;

- Examination of the potential consequences of permitting full utility ownership of qualifying small power production and cogeneration facilities;
- Review of the requirement that utilities purchase from QF's at 100 percent of avoided cost and its effects on economic efficiency.

Evaluation of Power System Characteristics

Achieving economic design and operation of power systems is a continuing issue in Commission policy development, rulemakings, and case decisions. Staff evaluations address such items as the need for power, correctness of system operation and expansion plans, cost of planned and alternative system configurations, and opportunities for power pooling coordination. The Commission's decision to allow the inclusion of CWIP in electric rates will enable an earlier evaluation of power system characteristics, especially regarding the need for new power system facilities, including a detailed assessment of the potential alternative means of meeting demand for electricity at least cost.

The present time period is one of unusual financial and regulatory pressure on many utilities. The Commission is concerned that some of the effects of this, such as an increased loading of transmission facilities for inter-utility power transactions, may have an adverse impact on reliability. Staff conducts reviews of this matter in consultation with technical experts from the utility industry.

Electric Power Workload Trends

Although the number of rate filings decreased in FY 1983 and FY 1984, and remained slightly below the FY 1982 level in FY 1985, because of the complex nature and issues involved, such as CWIP, nuclear decommissioning and certain plant cancellation, the evaluation of these filings required more staff time to complete a comprehensive review. Interchange agreements have become more complex, requiring more study and review time. As of October 1, 1985, the Commission has received 38 applications for the inclusion of CWIP in the electric rate base. The CWIP rule was recently vacated by a court decision and remanded to the Commission for reconsideration; the Commission is reviewing the decision to determine what course of action to take. In addition to CWIP, a number of cases have been set for hearing to review the filings and determine whether or not the utilities acted prudently in cancelling plants. Also, an increasing number of utilities with nuclear generation have begun requesting current allowances in rates for future decommissioning. The review of CWIP filings and of decommissioning proposals of utilities actions in cancelling plants require extensive analysis and numerous clarifying data requests.

The President's Private Sector Survey on Cost Control recommended that the FERC could shorten the formal electric rate hearing process by allowing reconsideration of an initial decision by an Administrative Law Judge (ALJ) in order to increase the number of initial decisions which could be summarily affirmed by the Commission. This would enable the Commission to reduce significantly the number of cases in which a separate Commission opinion would be required. The Commission established such a rule (Rule 717) in June 1984. The Chief Administrative Law Judge also has instituted an expedited hearing schedule in a number of proceedings subject to Rule 717 which requires FERC staff and all other parties involved to accelerate their review process and to file testimony in an expedited manner. Through the end of FY 1985, this rule has been applied to 58 cases.

Financial Audits (Electric Utilities)

The Commission, in its ratemaking and other regulatory activities relating to electric utilities, has a continuing need for reliable and comparable accounting information from individually regulated utilities and the industry as a whole. This need is essentially met through the establishment and maintenance of a Uniform System of Accounts for Public Utilities and Licensees, through requirements for periodic financial reporting, and through a program of financial audits of jurisdictional companies.

The Commission's accounting regulations are kept current and modern by the issuance of rulemaking notices, orders and interpretations as necessary to reflect contemporary ratemaking actions, changes in financial accounting standards, and the issuance of new laws and regulations. The accounting information obtained from financial statements prepared under standards uniformly applied to all regulated utilities forms the basis for measuring both historical economic performance and compliance of billing practices with the terms of approved tariffs, clauses, and contracts. Additionally, the accounting information is used to determine the adequacy of current rates and provides the foundation for constructing ratemaking models useful for the development of future rates. The required assurance that the Commission must have that the basic financial information used in its economic regulation is sound and reliable is obtained essentially through a program of financial audits.

These audits are conducted on a cyclical basis. Approximately 85 percent of the 205 utilities subject to the Commission's accounting jurisdiction are audited on a four year cycle. The remainder are audited either more or less frequently depending upon such factors as the extent of automatic adjustment clauses, rate filings, and other similar considerations. The audits, which are conducted on-site by field auditors, encompass selected reviews of rate matters as well as audits of the basic financial statements and related books and records.

An important part of the audit program is the review of the automatic adjustment clauses. During each audit the staff places special emphasis on reviewing fuel costs because of the significance of these expenditures to determine if they were (1) computed in accordance with Commission Orders 352 and 517; (2) based only on eligible items of cost as provided in the regulations governing such clauses; and (3) based on actual costs which are reasonable and prudently incurred and properly recorded in the company's books. A company found to have improperly billed wholesale customers under the provisions of an automatic adjustment clause is ordered to refund any excess amounts with interest.

The financial audits continue to increase in importance as the complexities of accounting and ratemaking issues intensify. Among these are cancelled electric utility plant construction, cost disallowances by state regulatory commissions, and the phased-in effects of new multi-unit generating facilities. The audit staff is aware of the increased financial pressures that these issues present and must assure that the utilities satisfy the intent and conform to the Commission's accounting requirements.

In FY 1984 and FY 1985, some of the major areas of audit findings included accounting for (1) utility plant investments, (2) income taxes, and (3) fuel cost accounting. These audit findings resulted in adjustments to rate base accounts in excess of $350 million for FY 1984 and Fuel Adjustment Clause refunds in excess of $17 million.

For FY 1987, the audit staff plans to complete 40 audits, the same as in the previous year, thereby resulting in a decrease in the pending audit workload by the end of FY 1987.

FY 1985 Accomplishments:

- Completed almost 2,000 workload items and reduced pending by 2 percent.
- Issued a NOPR in Docket No. RM83-63-000 that would reduce the burden and streamline the process for individuals seeking authority to hold interlocking positions with affiliated companies.
- Issued a Final Rule in Docket No. RM83-66-000, which reclassified electric utilities and licensees from four classifications (Classes A, B, C, and D) to either "Major" or "Non-major." The criteria for classification were changed to mitigate the effects of inflation on utility reporting requirements. Associated changes in the Uniform System of Accounts were also made as part of the rule to simplify accounting procedures to be followed by utilities.
- Issued a Final Rule in Docket No. RM80-36-000, Generic Determination of Rate of Return on Common Equity for Electric Utilities, and completed proceedings to determine the first such generic return and the first quarterly update.
- Issued a Final Rule (Order No. 400) approving a new ASC Methodology for Sales of Electric Power to Bonneville Power Administration in Docket No. RM84-16-000.
- Completed a review, due every four years, of the automatic adjustment clauses used in jurisdictional rate schedules.
- Issued a Notice of Inquiry in Docket No. RM85-17 (Phase I) on Regulation of Electricity Sales-For-Resale and Transmission Service (coordination and interchange sales).
- Issued a Notice of Inquiry in Docket No. RM85-17 (Phase II) on Regulation of Electricity Sales-For-Resale and Transmission Service (marginal cost based rates for requirements customers).
- Issued an NOPR in Docket No. RM83-41-000 on Rules of Discovery for Trial-Type Proceedings. By providing guidance on discovery, the proposed rules should help to expedite the Commission's formal hearing proceedings.
- Issued an Operating and Financial Profile report of the Electric Utility Industry in April 1985.

Workload

During FY 1987, it is expected that 825 electric rate filings, 73 formal investigations, 95 corporate and interlocking applications, 600 small power producer/cogeneration qualifications and 30 exemption applications, 10 Federal rate reviews, and 125 securities actions and financial audits will be completed. FY 1985 has a higher than usual number of completions primarily because of larger than expected levels of receipts and the subsequent completion of filings in two categories--rate filings, which increased by 11 percent from the projected level of 725 to 807 and Small Power Producer/Cogeneration filings which increased by

188 or more than 30 percent from a projected level of 600 to 788. These two categories are expected to stabilize in FY 1986 and FY 1987. Table 20 shows receipts and completions for FY 1985 through FY 1987.

Table 20 - Electric Power Workload

	Receipts			Completions		
	FY 1985	FY 1986	FY 1987	FY 1985	FY 1986	FY 1987
Rate Filings	807	825	825	840	825	825
Formal Investigations - General Rate Increase	52	42	40	39	47	44
Formal Investigations - Other	41	25	25	35	50	29
Corporate Applications	24	20	20	25	20	20
Interlocking Positions	102	75	75	105	75	75
Small Power Producer	490	360	360	474	360	360
Cogeneration	298	240	240	301	240	240
Exemptions	20	10	30	33	15	30
Federal Rate Review	7	10	10	18	10	10
Securities (Negotiated)	18	25	25	15	25	25
Securities (Competitive)	38	60	60	47	60	60
Financial Audits	40	35	35	49	40	40
Total	1,937	1,727	1,745	1,981	1,767	1,758

By the end of FY 1987, the pending workload will be reduced to 430 cases; about 3 percent less than FY 1986 and 11 percent from FY 1985. The two areas that affect pending workload the most are the formal investigations-other which shows a 38 percent reduction since FY 1985, and financial audits which show a 22 percent reduction. Table 21 illustrates the level of pending workload for each category in the electric power regulation program.

Table 21 - Workload Pending at End of Fiscal Year

	FY 1984	FY 1985	FY 1986	FY 1987
Rate Filings	126	93	93	93
Formal Investigations-General Rate Increase	53	66	61	57
Formal Investigations-Other	71	77	52	48
Corporate Applications	6	5	5	5
Interlocking Positions	39	36	36	36
Small Power Producer	42	58	58	58
Cogeneration	80	77	77	77
Exemptions	25	12	7	7
Federal Rate Review	15	4	4	4
Securities (Negotiated)	3	6	6	6
Securities (Competitive)	12	3	3	3
Financial Audits	19	46 1/	41	36
Total	491	483	443	430

1/ Reflects increase of 36 in pending workload at the start of FY 1985 for financial audits due to a change in internal processing procedures.

FY 1987 Request:

The Commission is requesting $20,423,000 to carry out the activities of the electric power regulation program in FY 1987. A comprehensive review by staff of each workload category, the projected number of receipts and completions, the desired level of pending workload, and use of revised productivity factors determined the level of completions in FY 1987. The primary workload categories demanding the greatest staff support are formal investigations-general rate increase and other, rate filings, federal rates, and financial audits.

The requested resources will allow the Commission to process filings within statutory limits; establish just and reasonable rates for the transmission of electricity and its sale for resale; administer Commission responsibilities regarding cogeneration, small power producers, and the five Federal power marketing administrations; administer the Uniform System of Accounts and a program of financial audits; promote efficient performance of electric utilities; continue full-scale review of the existing regulatory process to ease the regulatory burden and streamline processing; and maintain an effective enforcement program.

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

Program Distribution of Resources
(000's)

	FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request
NATURAL GAS REGULATION	$46,989	$46,231	$45,174
Pipeline Certificate	15,157	15,243	14,767
Pipeline Rate	19,688	19,257	19,560
Producer Certificate	2,452	2,546	2,330
Producer Rate	2,112	2,516	2,460
Administration of Wellhead Pricing	7,580	6,669	6,057
HYDROPOWER REGULATION	25,686	27,990	29,343
Hydropower Licensing	17,795	19,201	20,745
Dam Safety Inspection	7,891	8,789	8,598
OIL PIPELINE REGULATION	4,034	3,782	4,139
ELECTRIC POWER REGULATION	20,821	20,849	20,423
TOTAL COMMISSION	$97,530	$98,852	$99,079

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

Effect of the Balanced Budget and Emergency Deficit Control Act of 1985
Public Law 99-177

Program Distribution of Resources
(000's)

	FY 1986 Appropriation	Reduction	Revised FY 1986 Appropriation
NATURAL GAS REGULATION	$46,231	$-1,922	$44,309
Pipeline Certificate	15,243	- 634	14,609
Pipeline Rate	19,257	- 800	18,457
Producer Certificate	2,546	- 106	2,440
Producer Rate	2,516	- 105	2,411
Administration of Wellhead Pricing	6,669	- 277	6,392
HYDROPOWER REGULATION	27,990	-1,163	26,827
Hydropower Licensing	19,201	- 798	18,403
Dam Safety Inspection	8,789	- 365	8,424
OIL PIPELINE REGULATION	3,782	- 157	3,625
ELECTRIC POWER REGULATION	20,849	- 867	19,982
TOTAL COMMISSION	$98,852	$-4,109	$94,743

As a result of the passage of the Balanced Budget and Emergency Deficit Control Act of 1985 (P. L. 99-177), on December 12, 1985, the Commission's FY 1986 appropriation is scheduled to be reduced, as of March 1, 1986, by $4,109,000; the revised FY 1986 appropriation would be $94,743,000. The effect of the reduction will be distributed proportionately to each of the Commission's programs as shown above. At this time, the Commission has not had sufficient time to fully assess the impact of the Act as to possible effects on workload, staffing, or revised funding allocations by object class.

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

Object Class Summary
($000's)

		FY 1985 Actual	FY 1986 Appropriation	FY 1987 Request	Difference
11.0	Personnel Compensation	$ 58,711	$ 60,892	$60,892	$ -0-
12.0	Benefits	6,434	7,424	7,041	- 383
13.0	Benefits for Former Personnel	21	36	20	- 16
	Subtotal	65,166	68,352	67,953	- 399
21.0	Travel & Transportation of Persons	1,923	1,972	2,190	+ 218
22.0	Transportation of Things	31	116	33	- 83
23.0	Rents, Communication & Utilities	11,425	10,268	10,316	+ 48
24.0	Printing & Reproduction	2,197	2,418	2,418	-0-
25.0	Other Services	14,673	14,195	14,731	+ 536
	Contracts	4,577	2,970	4,162	+1,192
	Support Services	5,396	6,625	5,831	- 794
	Energy Information Administration	4,700	4,600	4,738	+ 138
26.0	Supplies & Materials	1,381	1,063	1,063	-0-
31.0	Capital Equipment	732	465	372	- 93
42.0	Claims and Indemnities	2	-0-	-0-	-0-
43.0	Interest & Dividends	-0-	3	3	-0-
	TOTAL	$ 97,530	$ 98,852	$99,079	$ + 227

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

Summary of Full-Time Equivalents (FTEs)

	FY 1985 Actual	FY 1986 Allocation	FY 1987 Request
NATURAL GAS REGULATION	840	840	840
Pipeline Certificate	263	266	262
Pipeline Rate	337	320	338
Producer Certificate	66	68	63
Producer Rate	39	67	67
Administration of Wellhead Pricing	135	119	110
HYDROPOWER REGULATION	395	451	453
Hydropower Licensing	256	290	285
Dam Saftey Inspection	139	161	168
OIL PIPELINE REGULATION	65	63	70
ELECTRIC POWER REGULATION	337	335	336
TOTAL COMMISSION	1,637	1,689	1,699

Federal Energy Regulatory Commission
FY 1987 Congressional Budget Request

EIA Support for the FERC

Background

The DOE Organization Act (P.L. 95-91) established the Energy Information Administration (EIA) to carry out "a central, comprehensive, and unified energy data and information program which will collect, evaluate, assemble, analyze, and disseminate" energy data and information (Section 205(a)(2)). When the Federal Power Commission was reorganized into the Federal Energy Regulatory Commission (FERC), 138 positions were transferred to EIA, along with all data processing equipment and energy data collection and processing functions. EIA then assumed responsibility for providing to the Commission all data processing services related to energy data, as well as the collection of public use forms required by the Commission to carry out its regulatory responsibilities. EIA now provides support to FERC in four major areas: 1) forms collection, processing, and reporting; 2) automated energy data systems development and operations; 3) provision of computer hardware and related terminals for use by Commission staff; and 4) forms design and clearance with the Office of Management and Budget (OMB).

Forms Collection, Processing, and Reporting

EIA manages most FERC public use forms that collect data from industry for regulatory purposes. For each of these forms, EIA prints the forms, mails them to industry, receives the completed forms, performs nonrespondent follow-up, distributes the forms, and edits the data. Since many of the forms are automated, EIA enters the data into the computer, processes the data, and produces reports for FERC. The automated data is then available for analysis by FERC staff in processing cases or in preparing special reports on energy trends. It is estimated that EIA will spend approximately $1.8 million in FY 1987 on the collection processing and reporting of FERC forms.

Automated Energy Data Systems

EIA provides computer facilities and programming support for all new and existing computer systems required by FERC that contain energy-related data. For new systems, EIA designs the system to meet FERC needs, programs the system, provides operational and user documentation, and operates the system. For existing systems, EIA also performs special analyses at the request of FERC and provides related studies and support. It is estimated that EIA will spend approximately $1.1 million in FY 1987 to provide this support for FERC.

Computer Hardware and Terminals

EIA operates a large data center that is available for use by FERC staff and contractors. This center is located in the Forrestal Building and is accessed by FERC staff through terminals strategically located at FERC locations. High speed printers are located at 825 North Capitol Street and at 400 First Street. In addition, 35 computer terminals are located at 825 North Capitol Street, 20 at 400 First Street, and 10 in the regional offices. FERC's share of the computer facility budget is estimated to be approximately $1.3 million.

Forms Design and OMB Clearance

EIA provides forms design and statistical services for the public use forms required by FERC. Through the FERC data validation program, most of the public use forms have been or are being revised to reduce respondent burden and EIA has redesigned the forms. EIA also is the forms clearance agent for the Department and provides liaison with OMB for clearances. The Paperwork Reduction Act of 1980 greatly expanded the scope of OMB's review authority and has resulted in an increase in the number of clearances that must be prepared for OMB. In FY 1987, EIA will manage OMB clearance for approximately 20 FERC data collections -- estimated to cost approximately or $0.1 million.

Summary

During the past five years, EIA and FERC have worked together to implement a comprehensive energy data program to meet Commission requirements. This relationship has worked well and EIA has provided all of the support requested by FERC.

- Without the data collected on the public use forms, the Commission will not have the information required to carry out its regulatory responsibilities.
- Without automated systems support and access to computer facilities, the processing of casework will be adversely affected and the number of pending cases will increase.

The support that EIA provides FERC is critical to the success of our programs and to our ability to process cases in a timely manner. The budget for this support to FERC in FY 1987 is $4.7 million and is distributed as follows:

	Millions
Forms Collection	$ 2.0
Automated Systems Support	1.1
Computer Hardware and Terminals	1.5
Forms Design and Clearance	.1
Total	$ 4.7